THE ROCK GARDEN

E. H. JENKINS

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THE ROCK GARDEN

First published (*as "The Small Rock Garden"*) 1913
New Edition, revised and enlarged, 1920

Ideal Plant Grouping in the Rock Garden.

THE ROCK GARDEN

By

E. H. JENKINS

Author of "The Hardy Flower Book"

LONDON

PUBLISHED AT THE OFFICES OF COUNTRY LIFE, LTD., 20, TAVISTOCK STREET, COVENT GARDEN, W.C. 2, AND BY GEORGE NEWNES, LTD., 8-11, SOUTHAMPTON STREET, STRAND, W.C. 2. NEW YORK: CHARLES SCRIBNER'S SONS

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PREFACE

IN the whole history of gardening there has never been so much interest taken in the cultivation of alpines as there is to-day. Not very many years ago it was quite exceptional to find a rock garden worthy of the name in any but the largest of our private gardens. To-day, however, a garden of any appreciable dimensions is not considered complete unless it contains a portion devoted to the cultivation of alpines.

The primary reason for this development is undoubtedly the beautiful alpine plants which have been so successfully displayed at the great horticultural exhibitions. The public have seen the wonderful variety of plant life that can be arranged in a natural manner in a small space, and the resulting demand for rock gardens has, during recent years, been little less than phenomenal. The second, though minor reason, has been the introduction of a great many new plants which are suitable for either the rock garden proper or the small bogs or pools that can be appropriately associated with it.

In conjunction with this widespread interest in rock gardens there has arisen a demand for information about them, and the plants suitable for growing therein, and it is for the purpose of supplying this information that this little book has been prepared. Rock gardening contains many pitfalls for the beginner, and the aim of this book is to show how these pitfalls may be avoided and how success may be achieved. Mr. Jenkins is well known amongst lovers of alpines as a practical exponent of their proper cultivation, and the advice he gives may be acted upon, with

every confidence, not only by the beginner but by all who are in any doubt as to the best methods to pursue. Believing as we do that sound information is of the utmost importance in a book on gardening, no effort has been spared to make this little volume as practical as possible, and it is with this end in view that the text and illustrations have been prepared.

The excellent reception accorded Mr. Jenkins' "Hardy Flower Book" has induced us to adopt a somewhat similar arrangement in this companion volume. The selection of a suitable site and the proper construction of a rock garden are the first essentials to success, and these are fully dealt with in the opening chapters. Bogs and cascades, the Moraine, wall gardening and paved pathways, all of which are legitimate adjuncts to the rock garden, are dealt with in separate chapters. Town and suburban gardens are not ideal for the cultivation of alpines, but many of necessity cultivate their plants in such surroundings, and for their assistance a special chapter has been included. The tabulated lists of plants suitable for all purposes and seasons with their height, necessary aspect, soil, colour, flowering period and method of propagation, will provide the reader at a glance with the necessary cultural details of the best alpine plants, and the list of undesirable plants for the rock garden concludes what is hoped will prove a practical and valuable guide to all who are interested in rock gardens and the beautiful if lowly flowers that find a home therein.

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THE ROCK GARDEN

CHAPTER I

THE BEST POSITION FOR A ROCK GARDEN

THAT there is nothing better than the best everybody will be ready to admit, hence "the best position for a rock garden," put in question form, would have for its answer, "One entirely in the open, a position removed from the presence or near proximity of large trees, equally prejudicial to success by reason of their root-spread and the shade or drip consequent upon their overhanging branches." In respect to the root-spread of certain trees—Elm, Lime and Poplar, for example—it need only be said that their root fibres are capable of travelling a considerable distance, even 40 to 60 feet from the spot where the original specimens were planted. Moreover, in the case of the Elm, the trouble is not at an end with the felling or uprooting of the tree, since on its roots are formed eyes or buds which, springing quickly into active life, send up suckers in all directions. In the case of the Lime, an instance came to my notice many years ago where the roots of the trees had crossed a road 40 feet wide, and so occupied a rockery on its one side as to render it useless for all plant life. In this particular instance the difficulty was overcome at the suggestion of the author by digging out a deep trench outside the rockery boundary and severing all root fibres, and subsequently remaking that portion of it affected. The first part of the suggestion had to be undertaken every two or three years, as the trees grew in an adjoining garden. Hence it will be seen at the outset that the selection of a suitable site is a matter of some moment if our efforts

are to be crowned with a moderately full measure of success. Even when large trees exist at some distance from the rock garden, the shade is detrimental to plant life, while light and air—which are among the life-giving essentials to alpine vegetation—are in large degree excluded from the plants. Even the more or less prevailing practice of planting Pines or tall-growing coniferous plants within the limitations of the rock garden merits vigorous condemnation, if only because of the exceeding dryness and soil-robbed conditions existing in the near proximity to such trees. Outside the boundary these trees might be tolerated or even desirable, though that would depend upon the immediate surroundings. Shade of a kind, and shelter, too, must be embraced if we would cultivate all the best a rock garden might contain, but these can be provided by the arrangement of the rock itself through the intelligent thought and work of the operator from within.

Equally bad, too, near to rock gardening of any kind is the presence of high buildings; light and air excluders of the worst type, and, often enough, the precursors of a set of conditions quite uncongenial to alpine vegetation. Extreme dryness is almost sure to be one of them, the rain being prevented from reaching the plants. Occasionally, however, one sees a rock garden surrounded by high walls—one so encompassed on three sides is in the mind's eye at the moment—its ill-effects, the outcome largely of dryness consequent upon a prevailing vacuum, not likely to be forgotten. Worst of all, the rats discovered in its unoccupied recesses a safe retreat; eventually it became to them a veritable stronghold as well. Thus it will be seen that, for varying reasons, even the selection of a suitable position—a modification of the "best"—is a matter of some importance. The "best position," therefore, is undoubtedly one quite in the open, one unfettered by tree life, and far removed from the formal garden and the house. It should, indeed, be a thing apart, a phase or department of outdoor gardening worthy of careful study

and special treatment. If to such a position as this there could be added a site having an undulated surface, then I believe we shall have gone a long way towards securing "the best" so far as position alone is concerned.

The Builder of the Rock Garden.—The best position, however, is, as it were, but a single step, though an important one, and in its subsequent treatment—in building up the other steps of which rock gardening may be said to be composed—it is capable of being made or marred. Its fashioner, or builder—I am strongly opposed to such terms as "designer" and "architect" in these matters, since it is not a brick and mortar arrangement whose "elevations" can be more or less accurately displayed—should be a man of the widest sympathies, a close observer of Nature and Nature's ways if the best results are to follow. Such an one will see to it that a certain informality, whether of rock or general outline, exists everywhere. Anon, it may be ruggedness, should the extent of the arrangement and its immediate environment render a bolder treatment more in keeping with the general surroundings, which, indeed, should never be left out of the reckoning. In any case, it should please by reason of its naturalness, whether it be large or small; and while we cannot imitate in lowland gardens the majestic grandeur of Alpine regions, we can, at least, use our best endeavours to demonstrate our sympathies with Nature and Nature's work by producing something which is at once picturesque and useful. It is necessary in these rock-gardening times to lay some stress upon this latter phrase, since not a few of the rock gardens we see are too slavish an imitation of Nature's own, and where rocks existed for centuries without becoming ornamented in the slightest degree, they are calculated to be of little use if rearranged on a like plan in our gardens. Much is possible by a modification of it, and the rock builder, possessing a more or less profound knowledge of the requirements of Alpine vegetation, is not likely to go far astray.

CHAPTER II

ROCKS AND SOIL

NATURAL versus Artificial Rock.—The question of the selection of the most suitable rock naturally follows closely upon that of position, and merits careful consideration. Upon a good, or, shall I say a right, selection much depends. Into rock-garden construction in the past two classes of rocks have freely entered without regard to their suitability or otherwise. These are the "natural" and the "artificial." Of the former there are many types—good, bad and indifferent—hence they merit attention accordingly. The so-called "artificial rocks" are almost all wholly bad, and merit a "vote of censure" from the inutility standpoint if nothing more. For the moment, however, these might be dismissed altogether, having regard to the greater value of natural rock (Fig. 1).

Natural Rocks.—These, as already stated, are of many types, and of necessity include the suitable and the unsuitable—that is to say, those of a sympathetic and nourishing nature, or the reverse, and as one of the primary objects of a rock garden is that it be endowed with alpine vegetable life, it is those of the first-named set that are best suited to our purpose. Into this category fall quite naturally the vast majority of the sandstones and limestones found in these islands. One uses the word "majority" advisedly, inasmuch as there are the good and bad of both, hence the value of a right selection at the outset. Certain types of rock—the inferior oolite of the Cotswolds for example—crumble quickly under the influence of frost and exposure, hence a rock garden constructed of such material

FIG. 1.—A NATURAL ROCK GARDEN.

FIG. 2.—AN EFFECTIVE USE OF WEATHERED LIMESTONE.

would soon be crumbling to decay, with, possibly, serious results. The magnesian limestone of the same range of hills is also unsuitable, as much for the defect already named as for its glaring whiteness, which renders it an eyesore.

The Great Oolite of the Cotswolds is, on the other hand, one of the most valuable to the rock-garden builder, being good in colour, variable in size, usually of a distinctly stratified character, and, above all, sympathetic to plant life. Occasionally, even with this excellent rock, a little selection may be necessary, and at such times the advice of the quarrymen who "work" the stone is well worth while. Quite naturally even the limestones are an exceedingly variable class, as witness those of the range just referred to and others from Yorkshire and Derbyshire. Of the serviceability of the limestones from these districts one has but to remark upon the thousands of tons which have found their way from thence to Friar Park, Henley-on-Thames, where for a score or more of years Sir Frank Crisp, Bart., fashioned out of its majestic blocks the noblest example of a rock garden this or any other country has ever seen. From the utilitarian standpoint no greater tribute could be paid to any class of rock, save that of the garden itself, which speaks in volumes at every turn. The rock employed is that known as Millstone Grit, and is available from blocks of a few hundredweights to others of ten or a dozen tons apiece. Chief among the good attributes of this rock, apart from the picturesque character and boldness which are so ennobling in effect, is its porosity, its apparent sympathy with all vegetable life, and that, weathering down by exposure and climatic influences, it is quickly brought into submission, soon losing the one defect of quarried newness inseparable from the greater rock masses. Weathered limestone (Fig. 2), the result of long exposure, is also valuable, its dull grey tone and that of certain Lichens and Mosses that often find a home thereon rendering it highly decorative. It

has the merit of age at the outset, and for the smaller type of rock garden is certainly one of the most desirable.

The Purbeck Limestone.—Quite one of the finest types of limestone is that known as the Purbeck, found in the neighbourhood of Swanage. This, in its selected form, is ideally beautiful and picturesque. In association with water it is surpassed by none and equalled by few. Moreover, it is available in large or small blocks, possesses a well-defined stratification (Fig. 3), and, above all, is entirely sympathetic to plant life. It appeals to me personally by reason of its rich marl-brown colour, and colour is not to be ignored in such work. In this respect, the Purbeck limestone and the great oolite of the Cotswolds have much in common, and both are excellent for the rock-garden builder. From the foregoing remarks it will be seen that limestone rocks are available in one form or another in many parts of the country, hence the best advice that can be given in such circumstances is to make use of those nearest to hand.

Sandstone Rocks.—While the best limestones are placed in the forefront so far as general utility is concerned—and none who have had experience with the varied classes of rock in relation to alpine culture would care to deny their right of place—the best sandstones may safely be placed a good second. These, like the first named, are of a porous or more or less absorbent nature, an attribute of the highest importance to the plants one has in mind. In like manner, too, they are widely distributed and greatly varied—Kent and Surrey, Cheshire and Worcester, Sussex and Warwick having, among others, their quota. Some sandstones, too, possess the attributes of boldness and ruggedness, are of good colour, and weather well. Others less good in these respects, and of a pale-yellow cheese-like colour, detract considerably at first from the arrangement and the plants, and attract much attention to themselves, which is not to be desired. Others,

FIG. 3.—LIMESTONE SHOWING STRATIFICATION.

FIG. 4.—A ROCK GARDEN IN THE MAKING. THE DRAINAGE FOR THE CENTRAL MOUND IS WELL SHOWN.

again, have neither "form nor comeliness," nor beauty that the rock builder may desire, and are obviously better suited to wall and house building. There are others of a thin, shaly character, which are only of service as stepping-stones over water or for paved walks whether in the rock garden or elsewhere. We have, however, on occasion, seen such stones up-ended in the rock garden, and while most incongruous looking, do not admit of ornamentation. Most usually, almost invariably, however, sandstone rock is to be regarded as of a sympathetic nature to plant life, to which the built sandstone walls of Cheshire, Worcester and Warwick and the outcrop and unquarried rocks of many parts bear abundant testimony. Plants of many diverse kinds, Ferns, Mosses, Lichens, and others appear to take kindly to it, and the fact is a valuable object lesson to the rock gardener.

The Red Sandstone.—As regards choice, however, I should place the red sandstone first, that of the old red sandstone formation more particularly by reason of its rich, red warm hue, which contrasts so effectively with vegetable life. From the standpoints of porosity and coolness it is also good, while its exposed parts are soon moulded and fashioned by wind and storm. The sandstone of this formation is generally reliable, while those of Sussex require a more intimate knowledge and not a little selection. In these matters the quarrymen on the spot are the best authorities. Some of the types of Sussex sandstone are, to the stranger, of a deceptive character, and because of their softness when freshly quarried would be rejected. It not infrequently happens, however, that such as these harden considerably by exposure and wear well. Others which, to the inexperienced, seem better, presently "fly" or crumble under the action of frost. Hence the value of the experience of those constantly working among them.

Tufa and other Rocks.—For outdoor work, the first-named on the question of expense alone may at once be dismissed. In the conservatory it is frequently pre-

ferred because of its high decorative value, though from the point of utility I know of no useful purpose it may serve that could not be served by the carboniferous limestones, *e.g.*, the famous Millstone Grit. It scores chiefly by reason of decorative effect, and in this sense tufa is probably unique. Highly fossilised rocks, as those belonging to the Gryphæa and Ostrea group of the Cotswolds, and others which in Nature have become crystallised by contact with rocks in the molten state, I regard as unsuitable for rock gardening in general. The first-named attract too much to themselves, and are otherwise too thin for effective work. In their own district they are frequently used, though they are mostly in demand for the dry stone wall fence so characteristic of the Cotswold region.

Granite Rock.—This is the last of the natural rocks of this country calling for remark here, and it is, in my opinion, the least valuable, primarily because of its nature—hard, impervious and non-absorbent—which is known to all. Hence it is at once, broadly speaking, unsympathetic to plant life, and, therefore, unsuited to the purpose we have in view. It has, however, the merit of cheapness, with a boldness and ruggedness which surpasses all others perhaps, and, of course, everlasting wear. In these respects it is, without question, unapproachable, and those whose idea of rock gardening consists in the piling up of huge boulders alone may find in granite something after their heart's desire. The object in view, however, is rock building in conjunction with alpine gardening, and while Nature through the centuries had adorned the granitic rock fissures or recesses with more or less luxuriant vegetation, the instances of such in gardens are exceedingly rare. In granite, too, the nourishing quality of the limestones is entirely lacking, hence our low estimate of its worth when we are gardening in conjunction therewith.

Artificial Rocks.—In the opening lines of this chapter these were referred to as "almost all wholly bad,"

meriting a "vote of censure" by reason of their inutility. I have no desire to withdraw one word of it or to lessen the severity of the condemnation. The kind of thing one has in mind is that made up of brick-bats, clinkered burrs and the like, the whole so cemented together as to make them appear like natural rock. They differ, however, from the latter by reason of their impervious and unsympathetic nature, and generally by their unsuitableness to plant growth. Presenting more or less externally the characteristic features of natural rock, they are usually a delusion and a snare, and one is sorry for the gardener whose duty it is to keep plants alive on such erections. Not infrequently they are welded and cemented together to form one continuous, unbroken mass, and, devoid of fissure or crevice—assets of inconceivable value in the best-arranged rock gardens—are all but useless to the gardener. I am speaking now of the great piled-up masses of such things, more than one of which occur in well-known gardens near London to-day. Many years ago the writer had charge of such a rock garden, and is, therefore, speaking as one "having authority" and not altogether as a "scribe." Moreover, it is difficult to realise any point in their favour, since they perform no useful office of which the natural rock is not capable, whether it be boldness or picturesqueness, while bereft entirely of the life-giving effects and charm of the natural rock masses when these are intelligently regarded. The main object of referring to the artificial kinds then is to discourage their use. They are not economical, rather the reverse, and remaining unornamented year by year have nothing of beauty to attract. Happily, the cement gives a colour tone which is not unbearable, and happily, too, these wrong things in right places are not on the increase.

The Question of Soil.—For the sake of convenience, one need but refer here to the staple soil; its greater variety, that suited to the largest number of alpine plants, can be best treated elsewhere. Rock, it should

be stated, despite its ornamental and not a little also its utilitarian value, is not essential to the cultivation of many alpines, while soil, freely mingled with grit or gravel, is absolutely so. Hence, at the outset an assured depth of soil, one free from such insidious weed pests as coltsfoot, bindweed or couch, should exist. Where the coming rock has to be built or arranged against a steep slope or bank, uncultivated through many years, it is of the highest importance that the weed pests named should, if existing, be eradicated at the start. In this the greatest personal care should be exercised, since once covered in, they will ramify in all directions, and, finding a congenial home beneath the rocks, become an intolerable nuisance for all time. Apart from this, not a few of them presently find a lodgment in the clumps of the more tufted alpines, which they quickly disfigure or perhaps destroy if they are not checked in time.

In general terms it should be stated that the greatest number of alpine plants prefer a light, loamy and rather gritty soil. Hence, should soil of an opposite nature exist as the staple, it will be necessary to remove and discard some of it during the early excavations. Clay soils, and those in particular of a tenacious, water-holding nature, will require special treatment and drastic measures—such as the discarding of them to a considerable depth and even effectually draining the subsoil might be rendered necessary. Thus it will be seen that the selection of a bank or slope where greasy, tenacious clay abounds is not desirable, and apart from the question of soil, an excessive rainfall might even endanger the stability of the structure as a whole. In those instances where sand, gravel or chalk to a considerable depth constitute the subsoil, the rock builder will have but little to fear in the matter of soils, since in all such it will be but a question of modification or readjustment according to circumstances. Moreover, in all of these the drainage of the whole—an item of supreme importance in some soils—is already perfected

and complete in Nature's own way. In very large degree mountain, bog and marsh plants, Trillium, Meconopsis, Lady's Slippers and the like prefer rich vegetable soils, peat, loam and leaf mould, in about equal parts, though to some of them a cool position with moisture is equally important. Into this latter category fall naturally some of the Phimulas, as rosea, denticulata and its great following, sikkimensis, Bulleyana and others, to each of which a cool or shady place with some degree of moisture is a necessity. In Chapters IV. and XIV., those dealing respectively with "The Bog Garden" and "Shade-loving alpines," the question of a suitable soil for given plants will permit of discussion in fuller detail.

CHAPTER III

A ROCK GARDEN IN THE MAKING

IN the making or fashioning of a rock garden the operator gets into immediate touch with serious work, which, in the not distant future, must of necessity reflect credit or the reverse. Hence, much thought and care are needed at the outset. Such fundamental questions as "Form and Outline," the all-supreme question *in some instances* of "Drainage," and the "Disposition of the Rocks" should be carefully considered in the order named. Each in turn, however, must of necessity incline to circumstances. For example, the "outline" of a rock garden may resolve itself into nothing more than its boundary line, while within that area "form" in its many phases, aspects and variety may everywhere abound. There is, of course, that type of it which, for lack of a better name, one may style "a rock garden over all," where path, stepping-stone, crevice and fissure each contain its quota of plant life, and, while not entirely effacing rock in any instance, playing its part by life-affording effects and charm in all directions. This, indeed, should be the aim and object of the true rock builder, since it is of a type which most nearly approximates to Nature's own. And it may be ours on either a large or small scale, just as miniatures are also true to their kind though in reduced degree. All this and much more is but the outcome of study, sympathy and foresight at the beginning or later on. It is, indeed, work of this kind, in conjunction with pulling down and putting up, which secures the best effects in the end. The rock garden that is "begun, continued and ended" in a week may be something to boast of at the moment. It is

Fig. 5.—A Rock Garden in the Making. The Lower Strata of Rocks are placed in Position First.

FIG. 6.—A ROCK GARDEN CASCADE IN THE MAKING.

FIG. 7.—THE CASCADE COURSE COMPLETED.

rarely convincing, however, as a good and permanent home for alpine plants, and if not this, it certainly misses its mark. In this connection the following passage may not be out of place. It is taken from that remarkable guide to Friar Park, Henley-on-Thames, where the most elaborately designed rock garden in this or any other country exists. At page 73 it is stated that "The leading idea was to make it as natural in appearance as possible, and the position of almost every stone was individually thought out before it was placed, or was subsequently altered to get the best effect." This, indeed, has been the keynote of the remarkable success achieved in the past; its harmonies or unisons but the reward of patience and perseverance, in conjunction with much fundamental knowledge and large sympathies with Nature's work. This, indeed, should also be the guiding spirit of every rock builder, and where it exists there need be no fear as to the results. A rock garden may be but a glorified rubbish heap, a stone-yard, or plant cemetery; or it may be a perpetual paradise teeming with the choicest of Nature's gems, just in proportion to the amount of thought and sympathy—not necessarily of cash—bestowed upon the work throughout.

Form and Outline.—We have said these must be largely governed by circumstances. The prospective site of our rock garden might be of many kinds, a steep, more or less rocky, one-sided bank, a natural depression, or a piece of level ground out of which it is hoped to raise something worthy. Hence, all cannot be treated alike. The worst idea of all—it is mentioned in the fervent hope that it may not be any longer propagated—is that type of rock garden which exposes the rock everywhere. One sees such incongruities beside lake or pond; occasionally it may be with a view to shut out something else, or anon built upwards from the turf without rhyme or reason. Such erections suffer most of all from extreme dryness, and are usually

a failure. It would surprise one, indeed, if they were anything else. At all times and upon all occasions air and wind are playing an antagonistic part, and the whole idea is so opposed to Nature that the error should be obvious at a glance. In all good rock gardens only the surface should be exposed, not the footing-courses and the entire area of the superstructure to boot. Nature exposes but the superficial surface of her rock garden; millions of tons of rock and earth protecting it meanwhile. Hence, let me say, with all the emphasis at my command, that the elevated all-out-of-ground rockery without a protecting bank of earth would be the greatest of all fundamental errors, and, foredoomed to failure as it undoubtedly would be, should never be attempted—never, indeed, thought of, much less countenanced.

In the matter of outline, and where guiding pegs are a necessity, as they not infrequently are, the first essential is informality. Bays, recesses, prominences are also essential to the accommodating of the greatest variety of plants by reason of the diverse aspects they present. These are important, no matter what the size of the erection. Where a path is contemplated it should take the form of a meandering streamlet, and never formally curved or straight as by line or compass—but moulded and fashioned in Nature's own way. A rock garden should never be in the nature of a vista, hence, too much of such a path should not be seen from any one point—the unseen parts are as pastures new.

Drainage.—Here, too, the operator will have to be guided entirely by circumstances, though *perfect drainage is an absolutely essential item.* Each district, each soil, has its own peculiarities, so that one can only be certain as to fundamental principles—guiding lines as it were, no one set of conditions sufficing for all. To the vast majority of alpine plants perfect drainage is of the highest importance, a fact that should be ever present in the mind of the rock builder. It may be that in the lie of the land this question of drainage is

perfectly met. It is possible, too, that with deep subsoils of sand, gravel or chalk, the operator will be able to ignore all idea of artificial drainage, or it may be that even the sharpest bank slope may have water oozing from it during six months of the year. The only effective way of dealing with all such would be to cut trenches in the bank to connect below the main pathways, and these latter and bank trenches filled with clinker, brick-bat or any waste stone would suffice for all purposes (Fig. 4). A much more serious condition of affairs is set where the staple soil is clayey loam, the subsoil being of the retentive or water-holding type. Here it will be necessary—if a successful rock garden is to be established—to effectually and systematically drain the entire foundation or base before laying a single stone. In such a case the cost of providing a few dozen loads of chalk or other suitable material would be small compared with that of excavating, discarding in part the soil, and supplying fresh, since, in such circumstances, every inch of soil would require special treatment also. It is, however, within the bounds of possibility that any excess of water could be conducted to some central or extreme position there to constitute the supply for bog-loving plants. At Friar Park both drainage and stability are secured to the whole by thousands of tons of rock raised above a bed of natural chalk, and by thousands of deep fissures—albeit, rock and soil charged—running in all directions. In the clay-bound area, and by discarding the great bulk of the soil, it would not be difficult to emulate the Friar Park conditions, were it possible also in conjunction therewith to emulate the patience, perseverance and enthusiasm demonstrated by the great work itself. Thus it will be seen that even in the all-important matter of drainage there are circumstances and conditions requiring no elaborate precautions, while others necessitate the closest scrutiny and care. Hence, in this as in all else, the coat must be cut according to the cloth.

The Stability of the Rocks.—In the constructive work of the larger rock garden there is nothing of more vital importance than stability. Conversely, there is nothing so disastrous as shifting or settling rock. Such settling is most likely to occur after heavy rains, and in those instances where much fresh soil has been piled up or where the bank soil is of a greasy, retentive nature. In such cases, the result is not pleasant to contemplate. It might seriously affect the erection as a whole or in part, and cause much otherwise unnecessary work. Hence there is the need of starting from a solid foundation (Fig. 5). In the majority of gardens a comparatively solid foundation can be obtained on gravel or clay. In others, adequate safety may be assured by sinking the larger rocks into firm, undisturbed soil. The naturally endowed site, undulated bank or rugged picturesque slope is in a different relation altogether, for the soil is already in position, and usually is stability itself. Since stability, however, is materially affected by the moisture-holding properties of the soil, and by the rainfall, this phase of the subject should be considered in conjunction with that of drainage.

Rock Building.—This constitutes the more serious constructive work, and it is here that the most glaring blunders are made. Writers on the subject repeatedly urge the teachings of Nature without giving the beginner in rock gardening the least idea of the good and bad, so far as these pertain to our gardens. In Nature, of course, everything is right, though it by no means follows that all is alike suitable. For example, in Nature we see great unquarried masses of rock that for gardening purposes would be wholly unsuited—which have, indeed, remained exposed for centuries, perhaps, without attracting vegetation to themselves, hence to copy and reproduce such would be a great mistake. Moreover, it is not the unyoked savagery of Nature that we require for our purpose, but her choicest bits, those into which we can introduce the exquisite inlaid jewellery of an alpine slope with every

hope of success. Too many rock gardens to-day err on the side of pretentiousness. Too much rock of too wall-like a pattern and too much exposed are among common errors. And, further, as though the chief idea of the builder was a display of rocks, they are thrust under one's nose in order, apparently, that their incongruities and shortcomings might be fully realised.

The Best Teachings of Nature in such matters—best because embracing utility with a graceful contour—are the teachings of our own hillsides. Here, in touch with the rolling bank—sculptured and fashioned by thousands of years—we see what is good, and, from the utility standpoint, all we need copy. As we have neither room for nor require the whole even of this, it will suffice if we grip its vital principles, modifying or adapting them to our circumstances as may seem desirable. The occasional boulder, projecting ledge or outcrop rock, now exposed, or, anon, nearly mantled from view by the ever-moving *débris*, will all be here, ever suggestive of possibilities by their position, connected or disconnected as the case may be, each an object lesson of the highest importance for those who have eyes to see. It will be seen how that these rocks invariably lie to the bank—the hillside—for the obvious purpose, apparently, of arresting the downward progress of seed and soil, and, while playing the part of receivers and retainers of moisture, also by their lie conducting it to the roots of the plants. Hence their teaching value is enormous. To comprehend all such teaching conveys is to grasp the first great fundamental principle of rock-building; to ignore it would be but to hopelessly flounder in the dark, and always with "rocks ahead." On the other hand a mere slavish imitation of unquarried rock would be wrong from every gardening point of view. These noblest monuments of Nature we may admire to the full from afar. Replicas of them in miniature in our gardens would be entirely out of place; wholly unsuited to the children of the mountains with which we desire to garnish them.

We have referred to the lie of the rocks to the bank and dwelt on its advantages. Occasionally the exact opposite is seen, where in stratified rocks the natural lie has been disturbed. In its worn and sometimes polished surface, the absence of cumulative grit or *débris*, we get great teaching value also—a direct example of what *not* to do. We also see like instances in many a garden where the rocks constitute a shoot directing all moisture away from the roots of the plants. Rocks having an inclination *down* the bank are to the gardener impossibles; they gather to themselves neither soil nor *débris;* dew and rain are speedily carried away, and, save for some long trailing subject, would remain indefinitely unfurnished. Equally bad and wrong, too, in a gardening sense, are overhanging rocks, those more particularly which roof over the plants, rendering the soil dust dry and unfit to the great mass of vegetable life. A few subjects may endure for a time in such places; but it is painful to see them. Quite wrongly placed, too, is the rock whose basal part is fully exposed. Frequently in Nature this is hidden from view, and soil and grit associating itself therewith would constitute an ideal spot for colonising the choicer plants. Here, indeed, the operator may copy Nature to the full, and in so doing will never err. The foregoing include some of the most valuable object lessons of our own hillsides, and from this standpoint are well worth committing to the tablets of the brain.

The Disposition or Arrangement of the Rocks is a matter of great importance, though impossible to discuss in detail. In principle, however, it is so nearly akin to "the best teachings of Nature" that probably the reader will have already grasped its import. We have seen how, in the main, the rock should lie to the bank, there to be in direct touch with an assured depth of soil uninfluenced by external conditions of dryness. The prevailing idea of the rock-builder should be that he is setting a certain rock or forming a given colony

for some particular type of vegetation. It may be a dryish place and sunny withal, suited to Opuntia, or the Cob-web Houseleek (Sempervivum arachnoideum). Or it may be a high-up rocky ledge where Saxifraga cotyledon in any form would find a congenial home; or a sunnier ledge, sub-vertical wall, or sharply sloping bank, somewhat lower down, where the great Pyrenean Rockfoil (S. longifolia) might fittingly congregate. Anon, he may be dealing with a more spacious area better suited to alpine Phlox, Polygonum affine, or Saxifragas apiculata or sancta. For so distinct a trailing subject as Polygonum vaccinifolium the face of a nearly vertical rock would have to be found, while for such notable groups as Haberlea and Ramondia moist shady ravines, or shady, nearly vertical, moisture-laden walls would have to be commissioned. These, however, are types for which allotted places and conditions are essential. Between them comes a great alpine host—the rank and file of an army thousands strong—whose requirements are less fastidious. The miniature growing Androsaces, such as pyrenaica, villosa, chamæjasme and others that bejewel the face of the rock in Nature, will be at home in chink or crevice, while the trailing, profuse-flowering A. lanuginosa might be given a few yards of space to fill with its silvery trails and pink-flowered tresses.

Avoid in rock-building continuous repetitions; diversify in some form or another the higher rock from that immediately below. Avoid, too, the stone wall arrangement. Don't let the base of a rock expose to view an ugly space. The base of a rock should be at least half buried from view. Be very sure, should it be necessary to arrange two pieces of rock one above the other, that no vacuum is allowed to exist. Such things must for ever remain ungarnished, inert, and an eyesore. Above all things, never employ stratified rock other than in its true form (see Fig. 3). To up-end a stratified rock is to ignore the best teachings of Nature, an offence alike to the good gardener and geologist.

Moreover, such rocks rarely possess planting value, and are calculated to remain bare for all time.

Fissure and Crevice.—In the arrangement or disposition of the rocks I regard these as of the highest importance, since they form, or should form, a setting—a fitting setting—for the choicest jewels found in Nature. It is into these that we can introduce, with every hope of success, the inlaid jewellery of an alpine slope, and, by endowing them with the best, make them appear a part of Nature's own. To the true rock-builder the fissure or crevice is far more precious than the larger planting areas, for in them he sees the hope of success for not a few of the sweetest of Nature's children, denizens of the higher rocks and secluded places, which are doomed to failure in ampler soil areas lower down. That they require and must have their own special fare there is no doubt; hence the rock-builder must see to it that every fissure is filled as the work proceeds; each to form a larder stored with the choicest morsels, grit, rocky *débris*, and soil after its own kind. Here, in touch with cool absorbent rock, quite removed from the soil and soil-damp so fatal in lowland gardens to high alpine vegetation, fed and nourished imperceptibly by dews and rains, with perfect drainage, and root fibres a yard or so away, many of these delightful plants will be as safe as the hills themselves.

CHAPTER IV

THE BOG GARDEN OR ROCK GARDEN POOL

I HOLD that the bog garden proper should be without the rock garden, amid moist woodland scenes or other place apart. Water, however, in some form or another—the tiny streamlet or the overflow from dripping cave supplying the rock garden pool, and from thence to a low-lying depression, might fittingly constitute an adjunct to the rock garden of an interesting and useful kind. For present purposes, therefore, we might assume we have such at our disposal; the water supply adequate yet under control. Dripping from fern-lined cave, or falling more abruptly as from a miniature cascade (Figs. 6 and 7), the first function of the surplus would be to occupy a pool, from the overflow of which the whole of the remainder would be supplied. By fixing the pool at a slightly higher level, or by more deeply excavating the depression at the other extreme, gravitation would be secured. If needs be the water-loving things could be accommodated first, the moisture and cool-loving subjects later. Throughout the great guiding principles should be vested in the securing of adequate moisture without stagnation. The one is life, the other is death.

Making a Bog Garden.—In its arrangement a watertight foundation is a necessity. It may be of puddled clay or concreted. When of any extent it should be arranged in sections so that the water may moisten the soil without passing too quickly away. If arranged in one section only, the outlet should be so raised and plugged that saturation of the whole at will is thereby

rendered possible. Above the cemented floor a six-inch bed of gravel or brick-bats should be placed. Over this a good thickly cut layer of turf, set grass-side downwards, and over this the soil—loam, peat and leaf-mould—or what is considered best for the plants. Of this latter a foot or eighteen inches should be supplied. By arranging the soil in compartments, quite a variety may be accommodated in a small area. For example, Primulas, such as japonica, pulverulenta, rosea, and Sieboldii, Anemone Robinsoniana, Parnassia and Ourisia coccinea, would be good for sandy or pasture loam, as would also, if space permitted, those fine foliage subjects Saxifraga peltata and Rodgersia. Trilliums (Fig. 8), Cypripediums, and such Lilies as canadense, superbum, and Grayi, would be happy in peat and leaf soil, while Darlingtonia, Sundew and Sarracenia would revel in peat and sphagnum. Pinguiculas could be strewn on the damp moss-covered sandstone bordering the streamlet. The following is a selection of plants suitable for the bog garden:—

SELECTION OF PLANTS FOR BOG GARDEN.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Anemone Robinsoniana	½	Shade	Loam	Pale blue	April	Division
Chrysobactron (Bulbinella) Hookeri	2	Any	Peat, loam	Yellow	June	Seeds
Cypripedium calceolus	1	Shade	,, ,,	Yellow, brown	May, June	,,
,, pubescens	1	,,	,, ,,	,, ,,	,, ,,	,,
,, spectabile	2	,,	Peat	Rose, white	June, July	,,
Gentiana asclepiadea	3	,,	Loam	Blue	July, Aug.	,,
,, ,, alba	3	,,	,,	White	,, ,,	,,
,, Andrewsii	1	Any	Peat	Blue	Aug., Sept.	,,
Lobelia cardinalis	3	,,	Loam	Scarlet	,, ,,	,,
Meconopsis integrifolia	2	Open	Peat, loam	Yellow	June	,,
,, Wallichii	5–6	Shade	,, ,,	Blue	July	,,
Omphalodes verna	Creeping	Any	Loam	,,	Spring	Division
Ourisia coccinea	1	,,	Loam, peat	Scarlet	May, June	,,
Pinguicula, in variety	¼	Shade	Sphagnum and stone	Various	Summer	Seeds
Primula denticulata, in variety ..	1¼	Any	Loam	,,	Spring	,,
,, japonica, in variety ..	2	Shade	,,	,,	May, June	,,
,, rosea	1	,,	Light loam	Scarlet	Mar., Apr.	,,
,, Sieboldii, in variety ..	1½	Any	Loam	Various	Apr., May	Division
,, pulverulenta	3–4	Shade	,,	Crimson	June, July	Seeds
Rodgersia pinnata	3	,,	,,	Cream	August	Division, seeds
,, podophylla	3	,,	,,	,,	,, ,,	,, ,,
Sarracenia purpurea	½	,,	Peat and sphagnum	Various	Summer	Seeds when available
Saxifraga granulata flore pleno ..	1	Any	Loam	White	May	Division when dormant
,, peltata	2–6	,,	Peat and leaf mould	Pink	,,	,,
Trillium, in variety	½–1½	,,	,, ,,	Various	Spring	Seeds

CHAPTER V

THE MORAINE

IN Nature the Moraine is of an age only equalled by mountain and glacier, at whose latter's feet it is most usually found; a mingling of sand, *débris* and rock of varying sizes and forms according to the nature of the ground above, to which, of course, and to the ever-melting snow and ice, they owe their being. In gardens, the artificially arranged Moraine is of necessity bereft of not a few of the chief characteristics of that formed in Nature. The altitude, the melting snow and ice of summer-time, with the eternally moisture-saturated rocks around, these are the things we realise to be absent, quite apart, possibly, from many more whose absence is less conspicuous at first sight. Then, too, we cannot overlook the great cooling effects of the glacier itself, on all that is in Nature around, and, while the Moraine is situated, as I believe the majority are, in full sun, the near proximity of so much ice must exert an influence of which we have but little idea. Then, too, it is doubtful whether we shall ever arrive at a true estimate of the value to plant life in those regions of the constant supply of the ice-cold water or its relative merits or demerits, compared with that supplied in the artificially arranged Moraine in our gardens. These, perhaps, are problems the true solutions of which will never be found, or, if discovered, will prove to be impossible of imitation.

The Lesson of the Moraine.—Nature everywhere affords the observant student innumerable object lessons, and one of the chief lessons of the Moraine, as it appears to the writer, *is the indifference with which*

Fig. 8.—Trillium Grandiflorum Roseum in the Rock Garden.

FIG. 9.—SILENE ACAULIS IN A MORAINE GARDEN.

many high alpines regard certain soils. It would be true of the most of them to say that they are but the creatures of circumstance. To arrive at this one argues from the standpoint that not a few of the plants found in natural Moraines were, perchance, long ago higher up; that they have been carried thither by the moving snow and ice, and, having become located in the Moraine, have endeavoured to adapt themselves to their surroundings. Their introduction may have been by means of seeds, or plants, or both, though, doubtless, no matter upon what rock formation the plants formerly existed, that rock would be saturated with moisture. Hence, the moisture, in conjunction with the poorest of soils—sand, grit, rock—as opposed to the richer vegetable soils, may be said to be among their greatest needs.

Its Relation to the Rock Garden. — What is a Moraine? The dictionary rendering is "an accumulation of stones and other *débris* found at the foot, along the edges, or down the centres of glaciers," hence, of necessity, well supplied with moisture, and, above all, always cool, at least, below. The glacier, the ice and snow, we cannot imitate; the cool conditions below we can in our own way. In Nature, too, the majority are in full sun; that condition we might also imitate, though, naturally, partially or very feebly. We can, however, give our Moraine the fullest possible exposure, and with moisture and crushed rock and grit at our disposal do much for the plants reputedly at home in such places. These latter, indeed, constitute the essentials; their opposites—rich soil and dryness—the fatal doses of poisons as it were to the root-fibres of those high alpines to which it must be so absolutely and entirely foreign.

Now, what is the relation of the Moraine to the rock garden as *we* know it? It is as the veriest babe in long clothes, its most recent phase, an adjunct, a something of which the best informed know a little and imagine much, a something, however, which is most likely to

become a necessity in all the best equipped rock gardens if the endeavour to cultivate choice alpines from near the snow line is to be crowned with greater success than heretofore. In all probability the oldest constructed Moraine in British gardens has not yet seen a couple of decades; a far greater number, probably, but a fourth of that time. To plant a variety of things to-day and write of their doing well in the Moraine a month or two hence does not command confidence. Above all, it lacks experience. We fully believe, however, that it will prove a home for many things hitherto a failure when grown in rich soils. How great the variety may be, however, and how much success is likely to be assured, are questions to be answered by time and by experience only. The free-growing alpine plants we grow quite well elsewhere, hence, our Moraine should not be in the nature of a dumping ground.

Constructing the Moraine.—The essentials are moisture, supplied from below, the presence of grit and, more or less, finely pulverised rock, and an entire absence of rich vegetable soils. Finely sifted peat and leaf soil in proportion to one-sixth for the majority adding a little loam for Gentians, Primulas and Ranunculus. The process of formation, to secure a watertight bottom and varying levels to suit the needs of a variety of plants, might be conducted on the same lines as those suggested for the bog garden (Fig. 9). A watertight condition may be secured by puddling with clay, or by the use of cement concrete or both. Beds or compartments at different levels, allowing for two or, possibly, three distinct depths, should also be arranged. With the watertight compartments completed and tested, and arrangements made for relieving the beds of superfluous moisture, *e.g.*, small drain pipes which might be plugged up at will, the filling in may be proceeded with. Over the bottom place a six-inch thick layer of rather coarse gravel. Next above place a thick layer of sphagnum or other moss to prevent

the finer sand particles being silted through. Above the moss arrange a few inches deep of sand, grit, finely pulverised rock and granite chips, the latter to be in the form of a surface mulch or in small proportion elsewhere. The water supply should be under complete control, and in addition to the larger lead per-

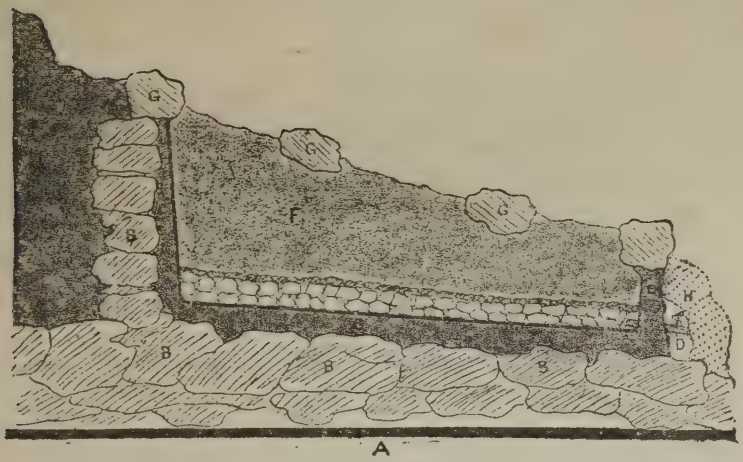

FIG. 10.—SECTIONAL PLAN SHOWING CONSTRUCTION OF A SMALL MORAINE.

A, horizontal line; B, hard core foundation; C, cement concrete, draining towards outlet; D, winter outlet with perforated zinc cover; E, 8-inch overflow; F, Moraine soil, upon small, then large rubble for drainage; G, decorative stones; H, stone hiding tap of winter outlet.

forated pipes to flood the whole of the beds, smaller ones, also perforated, should be arranged at the sides and, occasionally, in other parts of the beds where these are of large size, but always obscured a couple of inches below the surface. The best time for planting the Moraine is spring and early summer. The best type of plant is the seedling raised in pots or pans

on the orthodox Moraine plan. Such as these arranged in colonies or groups are not likely to disappoint once they become established (Figs. 9 and 11). Appended is a list of plants suggested for the Moraine. All are of diminutive stature, their flowers appearing in late spring and early summer.

PLANTS SUGGESTED FOR THE MORAINE.

N.B.—From the smaller Moraines those marked by an asterisk (*) might well be omitted.

Achillea argentea
* ,, rupestris
Androsace carnea
,, ciliata
,, glacialis
,, helvetica
,, villosa
,, ,, Chumbyi
Aquilegia cærulea
,, calcarata
,, glandulosa
Asperula athoa
,, nitida
,, suberosa
Campanula Allionii
,, arvatica
,, carnica
,, cenisia
,, excisa
,, pulla
,, Raineri
* ,, Stansfieldi
,, Steveni nana
,, Waldsteiniana
,, Zoysii
Dianthus alpinus
,, Freynii
,, glacialis
,, neglectus
Dianthus squarrosus
Douglasia vitaliana
Draba aizoides
,, imbricata
,, pyrenaica
Epilobium Dodonæi
* ,, obcordatum
Eritrichium nanum
*Erodium corsicum
Gentiana bavarica
,, imbricata
,, pumila
,, pyrenaica
,, verna
,, ,, angulosa
Geranium argenteum
Haberleas (all)
Hypericum coris
* ,, reptans
Leontopodium alpinum (Edelweiss)
Lobelia radicans
*Morisia hypogæa
Myosotis rupicola
Omphalodes Luciliæ
Papaver alpinum

Parnassias (all)
Pentstemon Davidsoni
Petrocallis pyrenaica
Pinguiculas (all)
Potentilla nitida
Primula Cockburniana
,, farinosa
,, ,, alba
,, frondosa
,, minima
,, rosea
,, scotica

Ramondia (all kinds)
Ranunculus alpestris
* ,, amplexicaulis
,, glacialis
,, parnassifolius

Saxifraga aizoides
,, ,, autumnalis
,, Boydii
,, ,, alba
,, Burseriana, in variety
*Saxifraga cymbalaria
,, Faldonside
,, Hirculus
,, lilacina
* ,, oppositifolia, in variety
,, Elizabethæ
,, Paulinæ
,, retusa
,, rocheliana
* ,, ,, coriophylla

Silene acaulis
,, Elizabethæ
,, Hookeri
,, pumilio
Soldanella alpina
,, montana
,, pusilla
,, pyrolæfolia

Viola cenisia

Wahlenbergia pumilio

N.B.—It should be clearly understood that the inclusion of a plant in the above list does not necessarily imply that it may not be grown elsewhere in the rock garden with success. All the plants named, however, are perfectly happy with Moraine treatment, while their inclusion would also tend to make that rock-garden phase the more enjoyable.

CHAPTER VI

ROCKWORK AS EDGINGS TO FLOWER BORDERS

THE prevailing idea here is to produce an informal edging of living plants as opposed to the dead formal edgings of brick and tile for all hardy flower or other borders. In some few instances, grass or turf walks take the place of gravel, and though they are not infrequently arranged on the straight line plan, we infinitely prefer them to others which destroy rather than make for beauty. The worst offenders in the case —and it were better for the gardener and all concerned that they should be mentioned by name—are the so-called garden-edging tiles in their varied and usually ugly patterns and colours. Not far removed are those others of plain brick set slantwise in the ground, and both are easily kicked out of place unless well cemented in. Set in position they are ugly in the extreme, wretched usurpers of ground otherwise easily adorned with rock and garnished with plant life and beauty. The rock-work edging may, on the other hand, when furnished, bristle for a long time in spring and summer with many-hued flowers, creating picture effects of their own, at once pleasing and natural.

Moreover, such creations, while beautifying the margin of the border for a very considerable period, also mirror into greater life the contents of the border itself. In other words, it is the very threshold of the border, and, later on, becomes an integral part of it. Not the least attractive feature of such an arrangement would be the cushioned tuft or trailing habit of the plants, the latter now spreading on to the

Fig. 11.—Gentiana Verna as a Moraine Plant.

FIG. 12.—ROCKWORK AS EDGINGS TO KITCHEN GARDEN BORDERS AT ALDENHAM HOUSE.

gravel walk itself or on to the border on the opposite side, in both doing good service. In some instances known to the writer the plants have been so inobtrusively introduced that, in conjunction with an entire absence of stone, there is really no line of demarcation 'twixt path and border, the plants having developed in much their own way. The idea, however good enough within the limits of the woodland garden or its approaches, is not recommended for general adoption for the border, no matter what its kind.

The Arrangement of the Informal Edging is simple enough, though its size—and width more particularly—would have to bear a certain proportion to the border of which it is destined to presently become a part. For example, borders of twelve feet or eighteen feet wide might be fronted by a margin equal to one-sixth part of these widths; in other words, they should be two feet wide and three feet wide respectively. Borders of these widths would, of necessity, be proportionately long, hence their margins would soon become a feature. The latter may be the result of the use of one kind or variety of plant, as *e.g.*, Aubrietia Dr. Mules, Phlox Nelsoni, Campanula pusilla Miss Willmott, Gentiana acaulis, Iberis correæfolia, or one of the many vigorous growing varieties of the newer mossy Saxifragas. An arrangement on these lines would be of a most imposing character; the chief and only drawback is probably the short-lived season of flowering. By embracing the whole of the plants named, and setting them out in lengthy stretches, an equally imposing array would be presented, and a much longer season of flowering secured. Small irregular pieces of sandstone or limestone would be the best material to employ, so setting them into the ground that they show six inches or more above it. There should be no formal placing of the stones. In every direction should there be seen a little irregularity. Neither should the stones be set out to the full extent suggested. Rather should they be within the boundary so that the two

fronts facing on path and border could be rightly treated with plant life (Fig. 12).

Do not overload the informal edging or bordering with stones. The aim should be to get the greater irregularity by the plants themselves; their own heights, and in some instances, a tendency to mount or clamber over the stones doing much in this direction. Assuming that the border has been well prepared, and that the soil is not of a tenacious clay, no special soil preparation will be necessary for the marginal subjects. Generally, however, soil of a light to medium character will be best. The spaces between the stones should be filled with soil to not more than half their above-ground heights. For planting, it is suggested that ordinary sized nursery plants or rather small fresh pieces be used in preference to older clumps. This is most important in the case of Gentian, Candytuft, Mossy Saxifrage, the subulata and other Phloxes, it being well known that old plants of the latter do not take kindly to the soil. In the appended list a selection of the best only is given, great variety being far from desirable: —

ROCK PLANTS FOR BORDERS.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Achillea tomentosa	½	Any	Any	Yellow	June, Aug.	Division
Ajuga reptans atropurpurea ..	½	,,	,,	Violet	,, ,,	,,
Alyssum saxatile compactum ..	¾	Sun	,,	Yellow	May, June	Seeds
Antennaria tomentosa	Creeping	,,	,,	Silvery foliage	—	Division
Arabis albida variegata	½	Any	,,	White	May, June	Division, cuttings
,, ,, fl.-pl.	¾	,,	,,	,,	,, ,,	,, ,,
Armeria cephalotes rubra ..	1¼ in flower	Sun	,,	Rose	,, ,,	Seeds, division
Aubrietias, any (a great class) ..	½	Sun and shade	,,	Lilac, rose, violet	May, July	Cuttings, seeds
Campanula pusilla	½	,, ,,	,,	Pale blue	June, Aug.	Cuttings, division
,, ,, alba	½	,, ,,	,,	White	,, ,,	,, ,,
,, ,, Miss Willmott	½	,, ,,	,,	Pale blue	,, ,,	,, ,,
Cerastium tomentosum	¾	Sun	,,	White	June, Sept.	,, ,,
Crucianella (Phuopsis) stylosa ..	½	,,	,,	Rose	July, Sept.	,, ,,
Dactylis glomerata variegata ..	1	,,	,,	Variegated grass	—	Division
Gentiana acaulis	½	,,	Light loam	Fine blue	May, June	,,
Hepaticas (all)	½	Shade	,, ,,	Red, white, and blue	Mar., Apr.	Division, seeds
Iberis (Candytuft) (all)	¾	Sun	,, ,,	White	Apr., May	Cuttings, seeds
Phlox subulata, vars. (any) ..	½	,,	,, ,,	White, lilac, pink	,, ,,	Cuttings
,, amœna	½	,,	,, ,,	,, ,,	,, ,,	,,
Saxifragas, mossy sorts	½–1	Sun, shade	Moist soil	Red and white	,, ,,	Cuttings, division
Viola cornuta purpurea	¾	,, ,,	,, ,,	Royal purple	Apr., Aug.	Cuttings

CHAPTER VII

THE TOWN OR SUBURBAN ROCK GARDEN

THE town rock garden must ever be of a subordinate kind—subordinate to buildings, fences, walls; arranged within a limited area, in danger of its soil area being robbed by tree roots travelling from adjoining gardens, and in various other ways. The strictly limited scope of its own boundary fences of necessity minimises all hope of "selecting a site," and not a little, too, that of "aspect" also. Light in very large degree will be shut out by adjacent buildings or trees, and, generally, the outlook, bereft of many of the essentials which the professional builder of rock gardens believes to be necessary to success, would appear very black indeed. Happily, however, the beginner in such matters is quite oblivious of all these things, and were it otherwise, so great is his determination and enthusiasm once he had made up his mind, that they would be accounted naught, and he would be prepared to face all and give his own ideas a chance, ofttimes successfully (Fig. 13).

Of rock-building principles he probably knows nothing and cares little. In the main he has made up his mind to have a rockery, and that after his own heart's desire. Of the orthodox methods of arranging sandstone or limestone he is unacquainted, and as he usually does not intend purchasing either, there is no need for him to learn. In short, his own ideas of the affair are as limited as the scope of his garden, and he considers himself surpassingly rich in the possession of a few clinkered burrs, brick-bats, or concrete blocks; anything, indeed, that is capable of being plastered together with cement to form "pockets" for soil and plants.

FIG. 13.—A TOWN ROCK GARDEN ONE YEAR AFTER ITS FORMATION.

FIG. 14.—A SMALL ROCK GARDEN SHOWING THE WISDOM OF MASSING FLOWERS.

A Fundamental Error in such a case is that the miniature "pockets" usually formed are not infrequently rendered almost watertight, and the plants being out of touch with mother earth quickly perish of starvation. There is, however, no need for this. The miniature or town rock garden need not of necessity fail because of its size or position; while for the rest there is a remedy, and the difficulties are not insuperable. By first digging up the existing soil, adding grit, gravel, old mortar or the like to afford increased drainage, and bringing into position a few barrowsful of garden soil, a mound will be formed equivalent to the soil bank of the larger erection. Then, when forming the receptacles—"pockets"—for the plants take care that their bases remain open, so that through the crevices or fissures thus formed the roots of the plants will have a chance of getting away. In these and in other ways the town rockery may be placed on all fours with that of a more pretentious character. Everything, it should be remembered, is being done on a small scale, hence miniature ravines may be constructed for the smaller plants, with snug little bays for many more (Fig. 14).

Natural Rock.—There is, of course, no reason why natural rock should not be employed, and either sandstone or limestone may usually be had at no great distance. A rockery bed of either, in sun or shade, would have a much prettier effect than the cemented article, though we are not going to deny that even out of this latter the amateur, by reason of his abundant enthusiasm, will obtain a very fair measure of success. Occasionally, a water tank for Lilies forms part of the scheme, its overflow constituting the supply for a bog garden, where plants from the dwarf-growing Sundews to Mocassin Flower and Panther Lily of eight feet high are grown. Such combinations are not a little remarkable in their way, and afford their owners an infinite amount of pleasure. The following plants may be expected to do fairly well in town gardens, except where the air is poisoned with chemical fumes:

SELECTION OF PLANTS FOR TOWN ROCK GARDENS.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Achillea Clavennæ	½	Sun	Gritty loam	White	July	Seeds
,, rupestris	½	,,	,, ,,	,,	June, July	Seeds, division
Androsace Chumbyii	¼	,,	,, ,,	Pink	May, June	,, ,,
Anemone Hepatica, in variety ..	½	Shade	Loam	Various	Mar., Apr.	,, ,,
,, angulosa	½	,,	,,	Blue	,, ,,	,, ,,
Arabis albida, fl.-pl. (Fig. 15) ..	½	Sun	Ordinary	White	Mar., May	Cutting ,,
Campanula muralis	½	,,	Gritty loam	Blue	Apr., July	,, ,,
,, pulla	¼	Shade	,, ,,	Royal purple	May, June	Division
,, pusilla, in variety ..	½	Sun or shade	Loam	Blue and white	June, July	,,
Dianthus alpinus	¼	Sun	Gritty loam	Rosy crimson	June	Seeds
Draba aizoides	¼	,,	,, ,,	Yellow	Apr., May	,,
Erigeron aurantiacus	½	,,	Sandy loam	Orange	May, June	,,
Gentiana acaulis	½	,,	Light loam	Fine blue	,, ,,	Division
Geranium cinereum	½	,,	,, ,,	Rose	May, July	Seeds, division
Gypsophila cerastioides	Creeping	Sun or shade	Sandy loam	White	,, ,,	,, ,,
Iberis sempervirens (Little Gem)	½	Sun	Any	,,	,, ,,	Cuttings
Leontopodium Alpinum (Edelweiss) (Fig. 16)	¾	,,	Limestone soil	,,	June, July	Seeds
Myosotis alpestris	¼	Partial shade	Sandy soil	Blue	May, June	Seeds, division
,, rupicola	¼	,, ,,	,, ,,	,,	,, ,,	,, ,,
Onosma tauricum	1	Sun	Gritty soil	Yellow	June, July	Cuttings
Ourisia coccinea	1	Shade	Peat and loam	Scarlet	,, ,,	Division

Fig. 15.—The Double Arabis as a Rock Garden Plant.

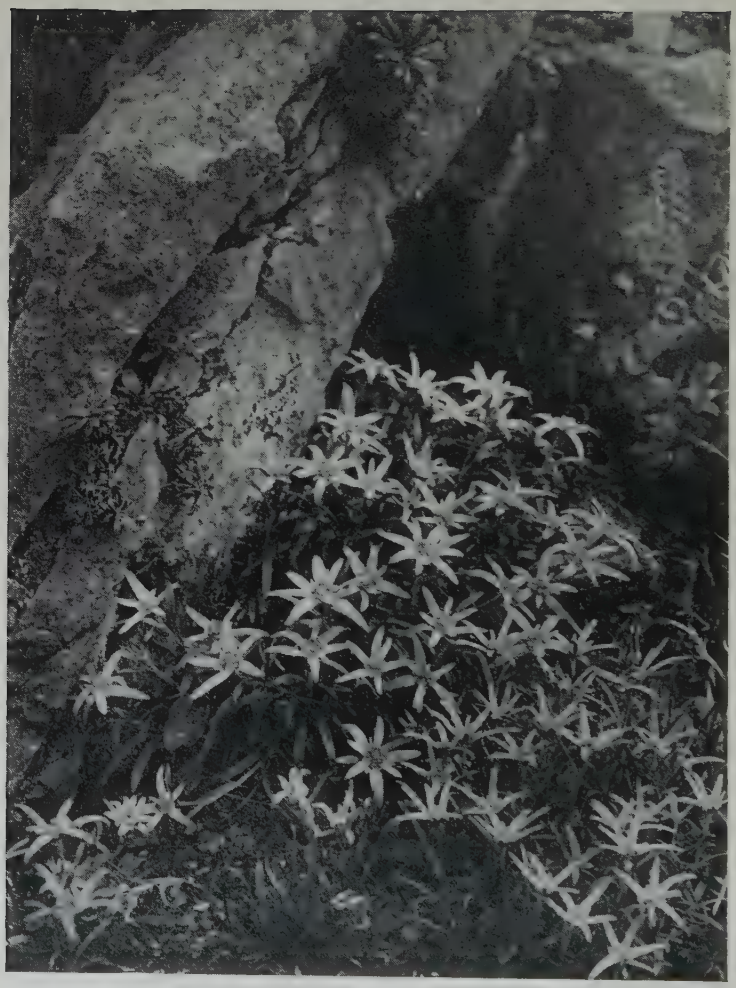

Fig. 16.—The Edelweiss (Leontopodium Alpinum).

SELECTION OF PLANTS FOR TOWN ROCK GARDENS (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Phlox subulata Nelsoni	Spreading	Sun	Light loam	White	May, June	Cuttings
Primula farinosa and alba ..	¼	Partial shade	Leaf mould and loam	Pink and white	,, ,,	Seeds
,, nivalis (pubescens alba)	¼	,, ,,	Rich loam	Pure white	Apr., May	Division
,, marginata	¼	,, ,,	Gritty loam	Lilac-blue	,, ,,	Division, seeds
,, rosea	½	Moist and shade	Damp soils	Rose	,, ,,	Seeds
Ramondia pyrenaica	½	,, ,,	Peat and loam	Mauve	June	,,
Saxifraga aizoon rosea	½	Sun	Gritty soil	Rose	,,	Division
,, apiculata and alba ..	½	,,	,, ,,	Yellow and white	Feb., Mar.	,,
,, burseriana major ..	½	,,	,, ,,	White	,, ,,	,,
,, ,, gloria ..	¼	,,	,, ,,	,,	,, ,,	,,
,, cochlearis	1	,,	,, ,,	,,	June	,,
,, ,, minor ..	½	,,	,, ,,	,,	,,	,,
,, Elizabethæ	¼	,,	,, ,,	Yellow	Feb., Mar.	,,
,, lantoscana superba ..	½	,,	,, ,,	White	June, July	,,
,, longifolia	1¼ when flowering	,,	,, ,,	,,	Summer	Seeds
,, muscoides purpurea ..	¼	Sun or shade	Moist loam	Reddish	Spring	Division
,, mossy sorts (new) ..	¾	Partial shade	,, ,,	Red and white	,,	,,
,, Wallacei (Camposii)	¾	,, ,,	,, ,,	White	,,	,,
Sempervivum arachnoideum ..	Spreading	Sun	Gritty soil	Pink	July	,,
Shortia galacifolia	¼	Shade	Peat and loam	Pink and white	Apr., May	,,
Silene acaulis	Carpeter	,,	Moist loam	Pink	July	,,

CHAPTER VIII

WALL GARDENING

GARDENING on walls is considered by many to be in the nature of a novelty. It is not so, however, though, compared with gardening as a craft, it is certainly modern. Forty or more years ago the writer had charge of an establishment largely devoted to hardy plant gardening wherein not less than a quarter of a mile of walls—retaining walls, chiefly—were to be found, specially constructed to receive plant life. A small part of these had existed for some time; the majority, however, were, so to speak, of the moment. One long stretch was in woodland shade throughout, but the efforts to grow plants, ferns or otherwise, were not crowned with much success. This I attributed to dryness, the overhanging woodland trees preventing the rain reaching the wall. The ferns we desired to clothe it with by the introduction of their spores. Wall-Rue (Asplenium ruta muraria) and Black Ribbed Maidenhair Spleenwort (Asplenium trichomanes) were a continued non-success. The woodland trees, chiefly clean, young oak, were more precious in the eyes of my employer than the success of the ferns, hence the latter had presently to take the proverbial back seat. I am fully persuaded, however, that such a wall, with its north-westerly exposure, would have given but little trouble in the open where occasional rains would have materially assisted vegetation. The unusual dryness in this case precluded success, and it is emphasised here for what it is worth. For the rest our success was proverbial, the majority of the walls being quite features of the place in which they were situated.

Fig. 17.—A Dry Wall shortly after Construction.

FIG. 18.—THE SAME WALL A YEAR LATER.

Some, however, were too well built for this phase of gardening—were, indeed, not built for it at all, but rather to support the great banks of clay that existed behind. Hence their small and almost solid stone-like joints presented some difficulty. Presently, however, Erinus did well, and, by degrees, Linaria pilosa, the smaller encrusted Saxifragas and the Cobweb and other Houseleeks were made to bejewel the joints. None, I think, appealed to me in that rather difficult wall so much as the Linaria named. It not only appeared made for the position, but became effective by threading itself between the joints in all directions.

Wall Building.—One or two essentials merit attention here. We have just seen that, for our purpose at least, the mason or correctly built wall is wrong, or, generally, ill-suited. The desire is to grow plants, not starve them. Hence if our wall has to perform the function of a retaining structure, the actual strength for this must be a thing apart from the planting section. In other words, it should be built in behind and quite obscured from view. For this purpose there is nothing like good cement concrete set with a batter of one foot in four or rather less, with three-inch drain pipes at the base and occasionally elsewhere to carry off the moisture. This much being in order, the planting wall—that portion we desire to make beautiful—can be arranged in front at will.

The Best Materials.—As in rock gardening proper, either sandstone or limestone should be selected (Figs. 17 and 18); bricks, clinkered bricks or burrs only being used as a last resource. We want just that degree of rugged informality here as in the rock garden. We want, too, the fullest measure of sympathy and nourishment the natural rock is capable of giving to the plants, believing that properly equipped walls are in the nature of a panacea for many of the ills to which high alpines in lowland gardens are prone, and believing, too, that the true solution is to be found in the drier conditions obtaining and in the use of natural rock or stone.

Apart, too, from the sympathetic and nourishing effects of natural rock, are the added advantages of larger cavities, greater grit and soil spaces, than would be possible in brickwork. To the plants these have an importance of their own.

The Set-Back Ledge.—In the process of building up the planting face of the wall, three things are absolutely essential. These are: (1) a slight dip or tilt of each stone from front to back (see Fig. 20) to carry water to the roots of the plants; (2) the set-back ledge

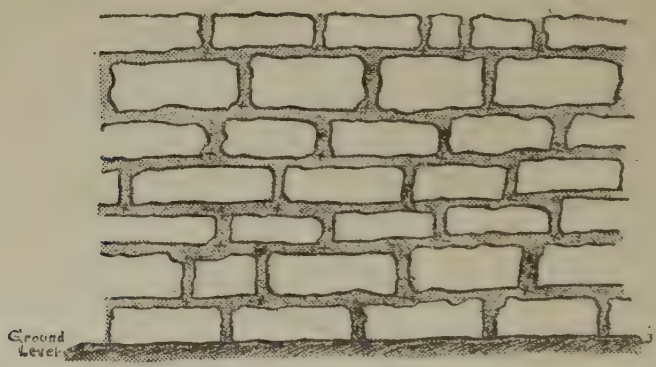

FIG. 19.—ELEVATION OF A DRY WALL.

The shaded parts represent soil; the crosses indicate positions for plants.

or front of the stone so that the one immediately below it intercepts rain or applied water; and, (3) that all spaces or crevices between stones be filled up with soil as the work proceeds. At the back of the stone work, and between it and the concrete retaining wall, a soil cavity not more than three inches wide might be arranged, and if charged with pulverised rock, old ceiling plaster, grit and loam in about equal parts, there will be presented to the roots of plants, in modified degree, the indeterminable fissure of the mountain, the

well-supplied larder from which the plants may draw sustenance at their own sweet will (Figs. 19 and 20).

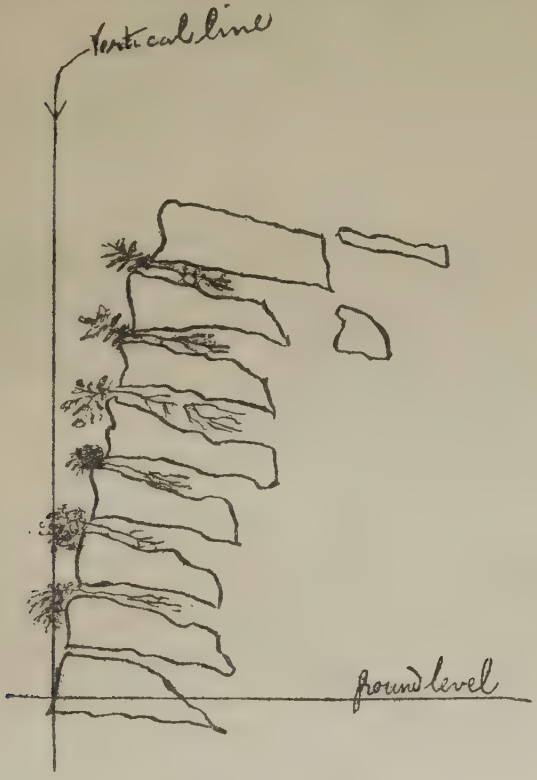

FIG. 20.—SECTION SHOWING THE PRINCIPLE OF ARRANGING STONES IN DRY WALLS.

Note how the stones slope back from the vertical.

When and How to Plant.—Planting may be done as the work of building proceeds, or when it has been completed. For the freer growing subjects it may be

done with the building; for choicer things it were better otherwise. On the principle of "one thing at a time being quite enough," I much prefer building and planting at different times. The mind can then be concentrated on either the building or the planting, with better results ensuing. Then I prefer plant grouping in the walls, a grey patch here, a white patch there, a sombre green as a mirror to the other two not far away. I prefer, too, as plants, small bits, freshly rooted cuttings, seedlings, or quite small divisions, anything, indeed, endowed with the possibilities of new life, destined soon to become vigorous patches. Such work I contend is best undertaken without interruption, not by attempting to do two things at once. The small seedling or freshly rooted cutting or divided example is easily pricked into position by the aid of a discarded carpenter's wood chisel or similar implement, and a colony of ten, twenty, or fifty quite expeditiously formed. An error to be guarded against is overplanting. Not every crevice needs a plant, and a rugged bit of exposed rock is picturesque in itself. Avoid rampant growers like the double white arabis for all but the boldest walls. As a summit plant in such a big patch it would be very effective.

Seed Sowing has the merit of cheapness, and, for old walls, ruins, and the like, and especially with such plants as Wallflower, Snapdragon, Iceland Poppy, Thrift or Valerian, is to be recommended. Within the garden, where the more select things should be seen, there is nothing to equal the cutting-raised plant, or small divided examples raised from the most distinct varieties of each group. Exceptional plants, like Ramondia and the great Pyrenean Rockfoil (Saxifraga longifolia) (Fig. 21), will of necessity have to be planted as fair-sized specimens, while so unique a subject as the Cobweb Houseleek should be introduced in single rosettes an inch or so apart. This plant is a great charm either in drier crevices of the wall or the rock garden, its cottony rosettes always whiter because

FIG. 21.—"THE QUEEN OF THE SAXIFRAGES" (SAXIFRAGA LONGIFOLIA).

FIG. 22.—AN OLD WALL SUCCESSFULLY PLANTED.

of the drier conditions and the immunity from soil splashes so disfiguring to it on level ground. For the type of plant described, February to April may be accepted as a good period for planting, always, however, to be followed, for some time, by careful attention to watering.

Treatment of Old Walls.—These are difficult of treatment generally, and the planter is well advised to confine his work to the top. In the case of old buttressed walls which terminate in an inverted **V**-shaped top and plinth, the lower parts are almost impossible of treatment because of the dryness. Having successfully treated the upper parts of such walls, I have found seeds by far the best method, mingling a few with a handful of moistened clay soil. The number should be strictly limited, as the plants which succeed in such places produce seeds abundantly, and vegetate freely and quickly. A few of the joints will have to be raked out, *i.e.*, freed of the cement-like mortar, and having been soaked a few times with water, introduce the seed-charged soil into the crevices. Autumn is the best time for the work, as before the coming of the dry weather of spring the seedlings will have taken to their places. Wallflower, Snapdragon, Aubrietia, Corydalis lutea, Red Valerian, Thrift, and Iceland Poppy are among the most useful subjects for this type of wall. Artificial caricatures of old ruins and the like are treated with a much larger number of things, and usually it is their undoing.

The following plants are suitable for planting in walls. Those preceded by an asterisk are best suited to bold positions, ruins, and similar places.

SELECTION OF PLANTS FOR WALL GARDENING.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
*Achillea tomentosa	½	Any	Any	Yellow	July, Aug.	Division
Antirrhinum (Snapdragon) ..	½–2	Sun	,,	Various	June, Aug.	Seeds
Arenaria balearica	Creeping	Shade	Wall face	White	May, Aug.	Division
Asplenium ruta muraria } Ferns	¼	,,	Old mortar	—	—	Spores
,, Trichomanes }	½	,,	,, ,,	—	—	,,
*Aubrietias (any)	Creeping or trailing	Sun	Any	Various	April, June	Seeds
Campanula cæspitosa and alba	½	Shade	,,	Blue and white	June, July	Division
,, muralis	½ tufted	Sun	,,	Blue	April, June	,,
,, pulla	½	Shade	Sandy loam	Royal purple	June, July	,,
*Centranthus ruber (Valerian)	2	Sun	Loam or chalk	Scarlet	July, Aug.	Seeds
Ceterach officinarum (Fern) ..	¼	,,	Old mortar	—	—	Spores
*Cheiranthus (Wallflower) ..	1	,,	Any	Various	Spring	Seeds
*Corydalis lutea (a gem) ..	Curtains of growth	,,	,,	Yellow	May, Sept.	,,
Dianthus Cæsius	½	,,	,,	Rose	June, July	,,
,, alpinus	½	,,	,,	Rose-crimson	,, ,,	,,
* ,, deltoides	¼	,,	Limestone	Rose pink	,, ,,	,,
Edraianthus serpyllifolius ..	Trailing	Light shade	Gritty loam	Royal purple	May, June	,,
Erinus alpinus and albus ..	¼	Sun	Any	Purple and white	June, July	,,
*Iberis (Candytuft)	Trailing	,,	,,	White	May, July	Cuttings

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Leontopodium alpinum (Edelweiss)	½	Sun	Limestone	White	May, July	Seeds
Linaria pilosa	Creeper	Shade	Gritty soil	Violet	,, ,,	,,
* ,, Cymbalaria	Trailing	Any	Any	,,	May, Aug.	,,
Omphalodes Luciliæ	Tufted	Partial shade	Gritty loam and peat	Blue	,, ,,	,,
Onosmas (any)	1	Sun	Loam in fissures	White and yellow	May, July	Cuttings
Papaver alpinum	½	,,	Gritty soil	Rosy	Summer	Seeds
*Phlox subulata, vars.	Trailing	,,	Gritty loam	White and pink	April, June	Cuttings
Phyteuma comosun	¼	,,	,, ,,	Bluish	May, June	Seeds
*Polygonum vaccinifolium ..	Trailing	,,	,, ,,	Pink	Aug.-Nov.	Cuttings
Ramondias (any)	½	Shade and moisture	Peaty soil	Various	June, July	Seeds
Saxifraga aizoon rosea ..	½	Sun	Gritty soil	Pink	May, June	Division
,, ,, rosularis ..	½	,,	,, ,,	White	,, ,,	,,
,, apiculata	½	,,	,, ,,	Yellow	Feb., Mar.	,,
,, Burseriana, in variety	¼	,,	,, ,,	White	,, ,,	,,
,, cochlearis	1	,,	,, ,,	,,	June	,,
,, lantoscana superba ..	½	,,	,, ,,	,,	,,	,,
,, longifolia	1½	,,	,, ,,	,,	Summer	Seeds
Sempervivum arachnoideum ..	¼	,,	,, ,,	Pink	,,	Division
*Zauschneria californica ..	1	,,	,, ,,	Scarlet	Aug., Sept.	,,

CHAPTER IX

THE PAVED PATHWAYS OF THE GARDEN

THE flagstone pathways of the garden are largely modern, their arrival being contemporary with the pergola, and both rightly placed and furnished have their uses. Near to old Tudor or Elizabethan houses they are excellent, and as much in keeping with the outward and visible parts of such places as would be the well-chosen, genuine antique furniture within. In modern erections of red brick, and in conjunction with such and brick-pillared pergolas, the flag-paved way is not a little incongruous—a misguided attempt to combine antique and modern—while a brick-paved way may be more in keeping with its surroundings. Honestly, however, I do not favour brick in any form. Red brick attracts too much to itself, and is out of harmony with most forms of plant life. In short, there is nothing to equal old paving stone where procurable, though in many districts it is quite a scarce commodity. Where procurable, that with rounded or long-ago broken corners and well-worn surface is by far the best, and carefully, *i.e.*, intelligently and not too formally, laid, it will at once appear its full age. In laying it there should be no attempt to make good the many faulty corners; these are needed most of all; to embellish them with plant life should be our first thought (Fig. 23). Never dream of employing a mason to lay them, for he of the fixed type cannot work without spirit level and the like, while his eternal side tapping with trowel will make hundreds of new cuts no one wants to see. A rough garden labourer will do the work much better—from the gardening point of

FIG. 23.—A PAVED PATHWAY WITH INTERSTICES SUITABLE FOR LOW-GROWING PLANTS.

FIG. 24.—WIDE STONE STEPS EFFECTIVELY PLANTED.

view. In not a few instances where these paved ways appear they were orginally laid to secure dry winter walks, after being laid in good mortar on a deep bed of cinder ash. Later plant cultivation between the joints came into being, and pretty effects having been secured, the idea grew, and has now reached some degree of popularity. In some quarters—a very feeble minority, it is true—the idea has been ridiculed, on the ground that a pathway was intended to be walked upon and not so occupied with plant life as to make movement difficult. If this style of planting were general, the complaint would be justified. We have seen a few instances where the plants used were much better suited to the garden border. These, however, are the errors of individuals, and the principle should not be condemned because of them. The number of suitable plants is not large, and a knowledge of their habits is at least desirable. In not a few instances flatish slabs of sandstone or limestone are employed. They are not a bad substitute where they are in agreement with their surroundings. The chief idea to be kept in mind is narrow openings between the stones; nine-inch wide gaps or more are an error. Do not lay the stones on a bed of brick earth and expect plants to thrive. A little preparation of the interstices is, at least, necessary.

The Stone Steps of the garden may likewise be made effective with pretty plants and ferns in nooks and corners, though in these, unless arrangements have been made for their reception, the available space is not large. As in the case of the paved way the plant life introduced should be in the nature of garniture (Fig. 24), affording a suggestion of age and repose. The plants, in other words, should never be an obstruction to the pedestrian, and should never be large enough to usurp positions for which they were never intended. The base of a set of steps or their sides may merit special treatment; the cracks between the "treads" will have to be considered apart. For these latter, the introduction, here and there, of a seed, with soil, will be

found a good method of planting. For the rest, small bits of plants will suffice. Fig. 25 represents bold and effective stone steps without vegetation. The subjects suitable are very few, and in the following list only the dwarfest plants have been selected. Those marked by an asterisk, thus (*), have low, spreading carpets of leaves.

*Acæna microphylla
*Antennaria tomentosa
*Arenaria balearica (beside steps)
Aubrietia tauricola
Campanula muralis
,, pusilla and alba
,, pulla
Dianthus squarrosus
Draba aizoides
Erinus, in variety (in steps)
*Helxine Solierolii
Hutchinsia (Noccæa) alpina
*Leptinella scariosa
Linaria pilosa (steps)
*Mentha Requieni (a gem)
Myosotis rupicola
Oxalis acetosella
Saxifraga aizoon, vars.
,, muscoides, vars.
*Sedum corsicum
* ,, hispanicum glaucum
*Sibthorpia europæa
*Thymus lanuginosus
* ,, serpyllum coccineum

FIG. 25.—BOLD STONE STEPS DEVOID OF VEGETATION.

FIG. 26.—THE ALPINE HOUSE AT KEW.

CHAPTER X

THE ALPINE HOUSE

FROM December to April inclusive the alpine house is unmistakably one of the most enjoyable phases of hardy plant gardening, albeit it has been called in question by a few—a very few. In its modernised form—it is not an absolute novelty—it has become more necessary than formerly owing to the great influx of early-flowering plants, whose beauty it was impossible to see or realise in the rock garden, or even in the ordinary garden frame. We grow plants, I take it, for our enjoyment. They afford pleasure and provide relaxation from the common tasks of life. Hence it becomes almost a duty that we do our best by them, and get the most out of them. In no other way is it possible to realise a tithe of their beauty or characteristic charm. To grow a plant to the flowering stage and see it dashed to pieces by rain or wind, or spoiled by snow, is disappointing. To be able to view the same plant in comfort in the alpine house, and see the best it is capable of giving for a fortnight or so, is the reward of patient care and intelligent cultivation. In winter-time in rock garden or frame not one-half of the plant's beauty is ever seen, and particularly is this true of the miniature growing class. In the alpine house the plant is brought nearer the vision, and points of interest revealed which, previously, were unnoticed. For example, I grew the lovely Saxifraga burseriana major for a score of years in rock gardens and frames without realising the delightful fragrance of its flowers. In the cold greenhouse this was detected at once, and the plant is endowed with a greater charm because of that fact.

The Essential Principles of an Alpine House.—Firstly, and, if you will, "secondly, thirdly, finally, and in conclusion," it should be—*must be*—an absolutely cold structure (Fig. 26). There must be no half measures about this, no putting in heating appliances in "case they are wanted in severe weather." Bogies of such a kind are quite out of place. We never attempted to artificially heat our rock gardens in the past, and we do not do it to-day. We have heavily matted the alpine frame, however, to our cost, and lost many a precious bit through damp or slugs, or both. The vital principle of an alpine house is protection—protection prior to and through the flowering period of the plant, protection which insures overhead dryness, and shields the subjects from the worst of our ever-changing climatic and atmospheric conditions. The plants of our choice are not tender, but invariably hardy; and hardier still where overhead dryness is secured to them, because they are invested with greater powers of endurance. Cold, dry cold, they enjoy; damp is doom. In my dealings with the alpine house it was an inflexible rule that the side and roof ventilators should never be closed. I had faith in the complete hardiness of my subjects, and provided them with hygienic conditions by a constant circulation of air. One of the finest collections of choice alpines I ever had in my keeping was wintered in a brick frame, amply pigeon-holed at back and front, yet those plants, in the teeth of wind and frost for weeks with the thermometer repeatedly at zero, and with no further protection than the glazed lights afforded, came through the ordeal unharmed. Overhead dryness is therefore important. I am emphatic on this point, possibly a little dogmatic, having seen the dangers and drawbacks of a "little heat" applied and misapplied, and equally those caused by damp and the condensing moisture consequent upon closing up house or frame. In a few words, the alpine house is intended to preserve character, not to destroy it. (Figs. 27 and 28).

Fig. 27.—A Choice Rockfoil for the Alpine House (Saxifraga Boydii Alba).

Fig. 28.—Pink, White and Blue Hepaticas.

FIG. 29.—ANEMONE BLANDA.

FIG. 30.—PRIMULA MARGINATA.

The Ideal Structure.—The nearest approach to the ideal is that known as span-roofed. It should occupy a position entirely in the open, with uninterrupted access to light and air, and commanding a maximum of winter sunlight. For convenience, a width of ten feet or twelve feet should do quite well, with ridge placed about seven feet high. Because of the greater measure of dryness the arrangement affords the structure on suitable foundations should be built from ground level, and not partly sunk—pit-house fashion. The most complete system of bottom, side and top ventilation that can be devised should be indulged in so that every part of the house may be abundantly ventilated at all times. Internally the staging should be raised to the level of the opening side lights so that the plants are ever receiving fresh supplies of air. If from any cause it is deemed necessary to close the side ventilators, those below the staging in the outside walls should be immediately opened—if not already open—to act in conjunction with the roof ventilators which should never be closed. By these means, dryness and buoyancy are secured. The plant stages should have solid bottoms, provided either by strong sheets of corrugated iron, by slate slabs, or by cement concrete with an inch or more of granite chippings, Thames sand, or finely powdered coke or shell to arrange the plants on. By reason of their introduction into the alpine house, the natural flowering period of the plants and their heights are somewhat changed, hence a list only of the names of the more suitable is given. The list might be indefinitely increased.

Achillea argentea
,, Heuteri
Adonis amurensis
,, ,, fl.-pl.
Anemone blanda (Fig. 29)
,, ,, scythinica
,, Pulsatilla
,, ,, alba
, ,, rosea
Anemone Robinsoniana
Daphne Cneorum
Crocus asturicus
,, pulchellus
,, sativus
Erythronium (Dog's Tooth Violets), any
Fritillaria aurea
,, citrina

Fritillaria Meleagris, in var.
,, persica
,, pudica
,, recurva
Galanthus (Snowdrop), any
Iris alata
,, bakeriana
,, histrioides major
,, orchioides
,, Heldreichii
,, reticulata major
,, ,, Krelagei
,, Tauri
Morisia hypogæa
Muscaria botyroides
,, ,, album
,, conicum
Narcissus cyclamineus
,, Bulbocodium, in variety
,, minimus
,, Queen of Spain
,, triandrus
,, W. P. Milner
Primula denticulata and alba
,, ,, cashmeriana
,, farinosa
,, marginata
,, megaseæfolia
,, pubescens alba
,, rosea
,, viscosa
Ramondia pyrenaica
,, ,, alba
,, serbica Nathaliæ
Saxifraga apiculata
,, ,, alba
,, burseriana gloria
Saxifraga burseriana magna
,, ,, major
,, ,, tridentina
,, Borisii
,, Boydii
,, ,, alba
,, ,, Faldonside
,, cotyledon pyramidalis
,, Grisebachii
,, Hostii
,, Kestonensis
,, oppositifolia
,, ,, alba
,, ,, splendens
,, Paulinæ
,, Sundermannii
,, sancta
,, scardica

N.B.—Any of the encrusted Saxifragas are worthy of inclusion for their enhanced leaf beauty alone.

Scilla sibirica, in variety
Sempervivum arachnoideum
Shortia galacifolia
,, ,, rosea
,, uniflora
,, ,, grandiflora
Silene acaulis
Sisyrinchium grandiflorum
,, ,, album
Soldanellas, of sorts
Thalictrum anemonoides
,, minus adiantifolia
Trilliums, any
Viola pedata
,, ,, alba

CHAPTER XI

FRAMES FOR ALPINES

FRAMES are necessary adjuncts either to the rock garden or alpine house. They are essential to the due preparation of the plants for the latter, and equally so as cultivators, caretakers and storehouses from which the supplies for the former may be drawn. Failures and deaths from causes unforeseen will of necessity arise, and slug and vole must always be reckoned with if the rock garden is to look its best. To be of a serviceable kind the alpine plant frame must be of special design or construction, and particularly so in the all-important matter of ventilation. The ordinary garden frame will not do. It is too close and stuffy, conserving too much moisture for woolly-leaved subjects in particular, and, generally, for other plants not of this nature, but which are not content unless breathing a pure, bracing air. We have, however, laid so much stress on the question of ventilation in respect to the alpine house that we have need here only to drive home the point, remembering that the frame is but a modified form of it, whose restricted air space and opportunities for ventilation are all opposed to the success of the plants we have in mind. Damp, stagnant air is fatal to most alpines, while highly congenial to the presence of slugs, the arch-enemy of our favourites. From more than one point of view, then, the chief object should be that we dispel damp.

The Best Type of Frame.—The nearest approach to the perfect frame I have ever seen or handled was brick-built. The front wall was two and a half feet high, the back wall three feet three inches. The frame

lights and wall plates were of the usual pattern. Studs, six inches long, were screwed to the latter so that the lights could be raised in wet weather. The pit portion of the frame was filled rather more than half its depth with rubble, clinker and ashes, and these, while insuring perfect drainage to the plants, raised them well above their general surroundings. Thus root-dryness with perfect drainage—a not unimportant item—was secured. The point to which I attach the greatest importance, however, was the pigeon-holed condition of the walls at back and front, a condition which, no matter what the weather, provided a constant stream of air over the heads of the plants day and night. Of the efficacy of this I have had abundant proof over and over again. Upon no occasion was any attempt made to stop any of these holes. What was especially aimed at was root and overhead dryness. Thus secured the plants were capable of enduring any frost experienced in these islands.

A Good Second to the above is the span-roofed garden frame of the leading horticultural builders, while a more exaggerated form of it might prove almost its equal. By this is intended a frame set upon brickwork two feet high, the pit thus formed to be filled with rubble of any description to afford drainage. It will thus be seen that great importance is attached to drainage generally and to lifting these frame-protected plants above their immediate surroundings. The soil at ground level is of necessity cold and damp or wet. To choice alpine vegetation these combined forces are often fatal; continuous damp is death.

A Matted-up Frame for Alpines is a delusion and a snare, and we say at once, with all the emphasis we can command that it is not only unnecessary, but, in certain circumstances, may be positively harmful. Hence we discourage it by every means at our disposal. These plants are made hardier and sturdier by perfect drainage, root and overhead dryness, and by continuous ventilation, and, given these, are capable of enduring

extreme cold with impunity. Coddling is entirely wrong, and artificial heat is worst of all. To these denizens of mountain, glacier or snow it is opposed in principle; a perpetual robber of that characteristic charm with which the plants have been so abundantly endowed by Nature. Hence from every point of view these alien methods should be avoided.

CHAPTER XII

THE PROPAGATION OF ALPINE PLANTS

REGARDED collectively propagation is a phase of the subject which more closely concerns the commercial aspect of the case albeit not a few amateurs are anxious to have a finger in the same pie. The commercial grower has to "create" stock of necessity to meet a demand, the amateur doing so in minor degree as the outcome of enthusiasm, and to see the results of his own handiwork. If, in the latter case, the desire leads to the increase of valuable stock, it makes for progress and the general good by increasing that sphere of interest which stimulates expansion and extension. The interest spreads, too, among friends and acquaintances, hence alpine plant cultivation receives a gentle all-round impetus.

Methods of Propagation.—Alpine plants are increased by the generally accepted methods of cuttings, division or separation of the tufts, and by seeds. The two former are the methods invented by man, the latter is Nature's own. Each, however, is important to the gardener, and should be indulged in as circumstances demand and allow. In some few instances all three are possible; in others, some may be either impossible or impracticable. For example, Ramondia, Haberlea and Primulas generally cannot be increased by means of cuttings, though the two first-named genera are reproduced abundantly from seeds, the latter submitting well to division of the root-stock while also coming freely from seeds. Much definite information on this head will, however, be found in the tabulated lists appended to many of the chapters.

Raising from Seeds.—This, as we have said, is Nature's own way, although we think the gardener does not fully realise its importance. A solitary capsule (seed vessel) may contain a score or twice that number of fertile seeds, and a dozen such may contain several hundreds. Too often these are disregarded and wasted, whereas a tithe of them in the seedling plant form would be sufficient to make a goodly group. The seeds of many alpines are small, others minute, and none of them require deep coverings of soil. Some prefer none at all, or at least very fine sand of not more than a shilling thickness. Where soil is used with the sand the whole should be baked to destroy weed seeds and insect life. It would be better if the whole of the soil used were treated in this way. Everything—pots and potsherds—should be scrupulously clean. Half fill the pots with the latter, cover with moss, and finally fill to within one inch of the rim with finely sifted, very sandy soil. Cover with very fine sand and make the surface quite even. Soak with water and allow the pots to remain an hour or two before sowing the seeds.

Time to Sow.—Generally the seeds should be sown in autumn or winter so that, vegetating in early springtime, there remains a full growing season ahead for development. This is most important. Not a few seedling alpines may be raised on a firm bed of cool, moist sphagnum moss with exposure, but they resent conserved or stagnant moisture about them. Seeds of a large number of alpines may also be successfully raised in finely sifted cocoa-nut fibre and sand in equal parts. While of great value in the case of seeds of quick germination, it is equally so in those of an opposite nature—a sort of panacea indeed for soil sourness, moss, and that much-to-be-dreaded pest of the seed pot, the "Liverwort" (Marchantia polymorpha). Overhead watering is also harmful. Stand the seed pots in deep saucers and water them from below. Cover each pot with a sheet of glass to keep off

birds and mice. Avoid thick sowing; it is often ruinous. On a shilling piece you may place a few hundreds of seeds. Do not sow them all in a four-inch diameter pot. A cold frame or greenhouse is the best place for the seed pots. In the case of the first named, the seed pots should be stood on slates or tiles, unless a perfect ash bottom exists to prevent the ingress of worms.

Things that Matter.—In this connection the vitality of the seeds is important. For example, the blue "Wood Anemones," A. Robinsoniana and others akin, with A. blanda and A. blanda scythinica, quickly lose vitality, and should be sown as soon as ripe. To keep them a few weeks or months entails not only a loss of time, but frequently a reduced crop. Cyclamen seeds may be kept for years, and then give a return to almost cent. per cent. But where is the gain, seeing that the seeds which fall from the capsules to the soil in early summer will yield clusters of seedlings a few weeks later without a thought or care? In a moist season or in much shade they will even vegetate within the half-open capsules, and the fact should be kept in mind. Saxifrages of all sections—"kabschias" and "mossies" particularly—soon lose vitality, and should be sown within a few weeks from harvesting. Even so the "mossies" may germinate in a couple of months or so, those of the other set taking eight months or even longer.

"**Sow as soon as Gathered**" is the best advice that can be given for the seeds of Gentians, Androsace, Ramondias, and Haberleas, whose grains are among the more minute, though this does not of necessity imply early loss of vitality. By following the advice given, however, a maximum crop of seedlings is usually assured. A like remark applies to the choicer Campanulas. The alpine Dianthi may be kept long with impunity should occasion arise, a fact which will enable the amateur to first deal with other and more pressing kinds. Seeds of all Primulas are best if sown

while quite fresh. Bog or moisture-loving kinds should, however, be strewn thinly on the surface of consistently wet soil, the wetness being an essential to quick germination and a cent. per cent. crop of seedlings. In their case soil covering for the seeds is unnecessary. Other alpine Primulas may be treated in the usual way. Biennial alpines quickly lose vitality, and their seeds should not be kept for any length of time. The Meconopsids are a case in point, and their seeds should be sown preferably in slight warmth within a month from their being harvested. A temperature of 40° or 45° as a maximum would be ample, the seed pans to be set in a light position near the glass.

Subsequent Care of Seedlings.—In the raising of choice alpines from seeds, damp is a great enemy, most to be dreaded where thick sowing of the seeds has been indulged in or where the frame or greenhouse is ill-ventilated. If to such conditions an inordinate use of the watering pot or syringe is added, the danger is still more grave. Raise all seed pots or pans near the glass with well-ventilated conditions. Avoid damping them overhead towards evening. Fraught with risk at any time, it would be highly dangerous during dull weather. Seedlings raised in slight warmth are often weakened thereby and more susceptible to damping off. Avoid watering in driblets. Water thoroughly when necessary, and always in the early forenoon, so that the seedlings may dry up before evening. Damping off may be arrested to some extent by dusting a mixture of powdered lime and sulphur among the seedlings, while a dryish soil condition will avert it altogether. Remember that thin sowing promotes sturdy growth, with comparative immunity from damping. Conversely thick sowing and the consequent crowding of the seedlings causes weakness, and in that condition damp may easily overtake them. Finally, attend early to the transplanting of seedlings, and in doing this bury the young plant right up to the seed leaves (cotyledons) and make it quite firm.

Propagating by Cuttings.—A large number of plants, Campanulas, Onosmas, Subulata and other Phloxes, Aubrietias, Lithospermums, Saxifragas and the like may, with advantage, be increased by means of cuttings. The first-named root quite well in pure sand, when cuttings of the soft young shoots are used. The others named, except Saxifragas, require to be secured with a heel, *i.e.*, youthful bits an inch or so long with the junction of a parent stem attached thereto. The flowering branches of the Aubrietias and the others named are wiry and often valueless to the plant propagator, but if the plants are cut back somewhat when flowering is over they will soon give a plenitude of cuttings of the right sort. These, when of the required length, should be pulled away by a downward movement and inserted in very sandy soil without further ado. Much time is wasted and thousands of cuttings spoiled in trying to "make" them. Moral: don't do it! A uniformly cool garden frame is the best place for the majority. Soft cuttings like those of Campanula do not mind a little warmth.

By Division.—This consists of pulling tufted growing plants to pieces, and nothing is easier. It is, of course, important that root fibres be attached to each division. In the case of some of the "mossy" and "encrusted" Saxifragas, also Cobweb and other Houseleeks, every growth will be found so endowed. Hepaticas will require to be divided with a knife, and so, too, will the Adonis, while the Garden Gentianella should first have all soil washed away and then be carefully pulled asunder. Spreading plants like the alpine Phloxes or Aubrietias are divided with greater success when the tufts have been mulched with sandy soil some weeks in advance. Where a few additional plants only are required, or an attempt is being made to add new vigour to the stock, this system, in conjunction with replanting, has much to recommend it.

CHAPTER XIII

THE PLANTING OF ALPINES

IN a general way the planting should resolve itself into the one word "colonising" or "grouping," and whether we are dealing with yard wide areas, or fissure or crevice, the importance of grouping—*i.e.*, the self-grouping of one variety of plants—not mixtures or jumbles, should be kept constantly in view. A principle to be observed is that there should be a beginning and an end to each group, then a rest for the eye, and that best of all rests—a complete change to something else beyond. The patchwork, indiscriminate grouping, too common on the improvised rock gardens at exhibitions, should be ignored, and in its stead a scheme or plan, definite and bold, should be adopted. Only in the case of the rarest kinds need the planter tolerate solitary examples, while the more free-growing, free-flowering plants should be seen in quantity. The solitary example of Saxifraga apiculata of a year ago should to-day, if it has made any progress at all, be the parent of a dozen—it may be a score—and these, planted at a few inches apart, would cover a considerable area. The division and replanting, consequent thereon, all make for progress, and, by affording room for the development of every rosette the plants contain, endows them with that greater vigour and freedom of blossoming all too rare. Left alone the same solitary example at the end of two years will have formed a cushion-like tuft, whose central parts, lifted out of touch with Mother Earth, will be in danger of burning up with heat and drought. Hence free periodical division and replanting is a safeguard

against such happenings. Not all the Saxifragas are, however, of the apiculata class, though a large number, and the figure includes sancta, Rocheliana, Cochlearis, alberti, and the whole of the "mossies," respond to a like treatment. Even the Burseriana and Boydii sets, Valdensis (of gardens), and others of diminutive growth must be included in this principle of free treatment; or, better still, to that of propagation by means of cuttings, to which one and all are alike amenable. But whether by cuttings or division the twain, in conjunction with replanting, tends to a fuller, freer development of the plant, the precursor of greater vigour, and a more abundant flowering. Hence such work is worthy of our best endeavours.

It should be noted that many alpines, Saxifragas, Primulas, the tufted Androsaces, and others, root afresh from the base of the rosettes of leaves, hence in replanting the divisions should be inserted low down, *i.e.*, almost level with rock or soil. In Nature, these children of the mountain receive frequent liberal mulchings of grit, rocky *débris* and the like brought down by snow and rain, and without which many would doubtless perish. In our dealings with these plants the principle it involves should be kept in view. Mulching, indeed, is of inestimable value to many alpines. The planting of seedlings does not differ materially from that of the divided specimen, and the main object of both is to create effective groups as opposed to the far feebler effect of solitary examples. Draba, rocky mountain and other Columbines, Morisia, Ramondia, Haberlea, and the great Pyrenean Rockfoil (Saxifraga longifolia) are among those easily raised from seeds, and a score or a hundred may be seen and enjoyed where a solitary plant would fail to attract.

In Fissure or Crevice Planting it is essential that no vacuum exists. In other words, that the fissure or crevice be fully charged with grit, pulverised rock and soil. If these are supplied in about equal parts there need be no fear as to the results, for successes with rare

plants will be greater here than on the more flat soil areas. In fine, the fissure sparkling with the choicest gems would, while revealing the sympathy of the planter with Nature's work, provide also a finishing touch to the whole. Silenes, Cotyledon Saxifragas and Onosmas will flourish here as nowhere else, and, while enjoying greater immunity from slug and other pests, will provide garniture of the best—garniture, alas! too often conspicuous by its absence in not a few of the rock gardens which have been hurried into existence during recent years.

CHAPTER XIV

ALPINES FOR SHADY AND SUNNY POSITIONS

HAPPILY for those who garden entirely in the open air, the choice of subjects is practically unlimited. Indeed, at no time in the history of hardy plants has there been such a choice as now, while to variety and general high excellence must be added that greatest of all attributes, amenability to the British climate. Without this, to growers and lovers of choice alpines, the great influx of novelties during recent years would be but the veriest farce, and the cultivation of them would soon go out of fashion. Fortunately for the lover of this particular phase of gardening, no such disaster has been experienced, and it is not impending. On the contrary, with the growing taste for these plants there has arisen a more intimate, intelligent knowledge of their requirements, and the rudiments once mastered but encourage the enthusiast to greater heights. And there is room and scope for all, just as there is out of the array of species and varieties now known to cultivators plants suited to every aspect, whether of sun or shade (Fig. 31). There are varieties, too, suited to all gardens, large or small, so that the millionaire or the artisan may indulge to the full and obtain an equal modicum of pleasure as a result. In dealing with alpine plants preferring sun or shade, we must not be taken as saying that those so marked must of necessity be subjected to an inflexible rule. For example, the shade-loving Ramondias, or such moisture-loving Primulas as rosea and sikkimensis, will be found perfectly happy in full sun if abundant moisture

FIG. 31.—A SHADY CORNER IN THE ROCK GARDEN.

FIG. 32.—A SILVERY-LEAVED ROCKFOIL FOR A SUNNY POSITION (SAXIFRAGA PARADOXA).

be within reach of the roots, and instances may be multiplied to the same end. To these, then, the moisture is essential to the altered conditions. Quite naturally, however, there are degrees, both of moisture and shade, meriting consideration. The plant of the woodland—Shortia, Galax, Anemone Hepatica, Gaultheria procumbens, Cyclamen, Epigæa repens, Rhexia virginica, Cornus canadensis, or Linnæa borealis—is content with the cool and shelter this Nature-given protector affords. In such a case humidity may not only be entirely lacking, but dryness may be present for long periods. Hence the uniform coolness of the position shutting out great heat would appear important. If we bring these plants into fuller light and exposure, more root moisture—the equivalent, in many instances, of much shade—must be given, albeit some would not respond so well even then. In short, the denizens of the woodland appear largely to have a choice apart, revelling as much, it may be, in the companionship of the low-growing herbs by which they are surrounded as in the shelter, and resenting separation from either. It is a little doubtful, perhaps, whether this fact is appreciated by cultivators at its fullest worth, and we direct attention thereto accordingly.

The true sun-loving subjects are not, on the other hand, so amenable to altered conditions as the shade lovers, since sunlight and sunheat—the chief stimulants to all vegetable life—would appear to be their all in all. To plant, for instance, the incrusted and allied Saxifragas (Fig. 32) in a shady place would quickly bring about their undoing. They revel in sunlight and warmth, dryness and perfect drainage coming next in importance. Some of these plants may, by reason of their vigour, be cultivated on level ground, in moist clayey soils, though not with a full measure of success. That is to say, some of their silvery characteristic beauty and charm is lost, a little it may be by a too close association with the soil and its richer food supplies, and a little also by the absence of rock which is

doubtless so much to the plants. Hence if we yearn for their higher encrusted development, we must see to it that the conditions engendering it are not lacking.

A good finger-post in this connection is the silvery-leaf character of certain plants the whole of which revel in sunlight and warmth. Outstanding instances occur in the case of some of the Androsaces—*e.g.*, A. lanuginosa, A. l. Leichtlini, and the more silvery Achilleas, as A. ageratifolia, A. argentea, A. sericea, A. Clavennæ, A. holosericea, A. Kellereri, and A. umbellata. Not only are such as these more perfectly happy in full sun and the silvery character enhanced; it is increased in those instances where the soil is freely charged with sand or old mortar rubble, which also insures free drainage and increased root warmth. Of this no better instance could be given than the Androsaces first named, which, revelling in sun and the fullest exposure, show to distinctly better advantage when grown on a sharply sloping bank in a soil mixture of nearly one half of old mortar or lime rubble. With the freer conditions of growth obtaining in such circumstances, flower beauty is naturally augmented—the twain a clear demonstration of the value of a rightly chosen position with the root fibres in warm, deep, perfectly drained soil. For such plants, however, there must be a combination of all the conditions named if complete success is to be achieved.

There is, however, another set of plants to which sun in conjunction with correct soil conditions is as life itself. Of this some Gentians are noteworthy instances. The common Gentianella (G. acaulis), G. verna, and its bolder variety G. v. angulosa, are never so brilliant as when seen in full sunlight. Sunlight and heat, too, materially assists flower expansion in their case, as it does in others of the race, G. Freyniana, G. septemfida, and others akin. It is even more life-giving for those brilliant autumn-flowering species, G. sino-ornata and G. Farreri, as those who have grown them both in sun and shade can testify. Indeed, sun, a generous depth

of peat and loam in equal parts, and ample moisture from April to October, appear the essentials for success in their case, and cultivators should mark them well. In quite another category is the Chilean Oxalis lobata, one of the choicest of rock-garden ornaments of October. At that season we do not look for the immediate return of the "prodigal sun," though should that happen our Oxalis should be so circumstanced as to receive its full share. Then the rich golden blossoms on 3-inch high tufts will be in the nature of a reward. In any case this precious plant is a sun-lover, and sunlight and warmth are essential to the opening of its flowers.

The following is a list of alpine plants for shady and sunny positions:

ALPINE PLANTS FOR SUNNY AND SHADY POSITIONS.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Acantholimon venustum ..	½	Sunny	Gritty loam	Pink	July, Aug.	Seeds
Achillea Clavennæ	½	,,	,, ,,	White	June, July	Seeds, division
,, Heuteri	½	,,	,, ,,	,,	,, ,,	,, ,,
,, sericea	½	,,	,, ,,	,,	,, ,,	,, ,,
,, rupestris	½	,,	Sandy loam	,,	,, ,,	,, ,,
,, tomentosa	¾	Open	Loam	Yellow	July, Aug.	Division
,, umbellata	¾	,,	,,	White	,, ,,	,,
Adonis pyrenaica	¾	,,	,,	Yellow	Mar., April	Seeds, division
,, vernalis	1	,,	Deep loam	,,	,, ,,	,, ,,
Æthionema grandiflorum ..	Trailing	Sunny fissure	Gritty loam and peat	Pink	April, June	Seeds
Androsace carnea	⅛	Partial shade	,, ,,	,,	April	Division
,, chamæjasme ..	¼	Sunny	,, ,,	White	April, May	,,
,, Chumbyii	¼	,,	,, ,,	Pink	,, ,,	,,
,, foliosa	⅛	,,	,, ,,	Pale pink	May, June	,,
,, lanuginosa	Trailing	,,	,, ,,	Pink	May, Sept.	Cuttings
,, sarmentosa	Prostrate	,,	,, ,,	,,	June, July	Division
Anemone alpina	1–2	Open	Deep loam	White	May	Seeds
,, Hepatica, in variety	½–¾	Half shade	Sandy loam	Red, white and blue	April	Seeds, division
,, angulosa	¾	,, ,,	,, ,,	Blue	,,	,, ,,
,, Pulsatilla	1–1½	,, ,,	Chalky loam	Purple	,,	,, ,,
,, sulphurea	1–2	,, ,,	Sandy loam	Yellow	May	,, ,,
,, sylvestris (Fig. 33) ..	2	Open	Loam	White	,,	,, ,,
Aquilegia cærulea	½–¾	Sunny	Sandy loam	Blue and white	May, June	Seeds

FIG. 33.—THE "SNOWDROP WINDFLOWER" (ANEMONE SYLVESTRIS) IN THE ROCK GARDEN.

Fig. 34.—A Hybrid Harebell (Campanula Stansfieldii).

ALPINE PLANTS FOR SUNNY AND SHADY POSITIONS (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Aquilegia glandulosa	½–¾	Sunny	Sandy loam	Blue & white	May, June	Seeds
,, Stuartii	½–¾	,,	,, ,,	,, ,,	,, ,,	,,
Arnebia (Macrotomia) echioides	¾	Open	,, ,,	Yellow	May	Division
Aster alpinus, in variety ..	½	,,	Loam	Pink, blue and white	,,	Seeds
Aubrietia, in variety	½	Open or distant shade	,,	Various	April, June	Seeds and cuttings
Campanula muralis	½	Open	,,	Blue	April, Aug.	Division
,, Profusion	Trailer	Cool fissure	Sandy loam	,,	Aug., Sept.	Cuttings
,, pulla	¼	,,	,, ,,	Purple	June, July	,,
,, pulloides	¼	,,	,, ,,	,,	,, ,,	,,
,, Raineri	¼	,,	Gritty loam	Blue	,, ,,	,,
,, Stansfieldii (Fig. 34)	¼	,,	,, ,,	Pale blue	July, Aug.	,,
,, Waldsteiniana ..	¼	Cool rock fissure	,, ,,	,, ,,	,, ,,	,,
Daphne petræa (rupestris) ..	¼	Half shade	Sandy peat	Wax pink	June	,,
Dianthus alpinus	¼	,, ,,	Sandy loam	Pink	May, June	Seeds
,, neglectus	¼	,, ,,	,, ,,	,,	,, ,,	,,
Edraianthus serpyllifolius ..	Trailer	Half shaded rocky slope	Gritty loam	Royal purple	,, ,,	,,
Gentiana Freyniana (Fig. 35) ..	¾	Full sun	Peaty loam	Blue	June, July	,,
,, Farreri	Trailer	,, ,,	,, ,,	Sky blue	Aug., Oct.	,,

ALPINE PLANTS FOR SUNNY AND SHADY POSITIONS (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Gentiana septemfida	Procumbent	Full sun	Loam	Deep blue	August	Seeds
,, sino-ornata	,,	,, ,,	Moist peat and loam	Rich blue	Aug., Oct.	,,
,, verna	Carpeter	Mid-day shade	Cool rooting medium	Deep blue	May	,,
Haberlea rhodopensis	¼	Shade	Sandy peat and leaf soil	Violet	May, June	,,
,, ,, virginalis	¼	,,	,, ,,	White	,, ,,	,,
Incarvillea grandiflora	¾	Open	Rich loam	Carmine	June, July	,,
Iris cristata	½	Sun	Peaty loam	Sky blue	May, June	Division
Lithospermum prostratum ..	Trailer	Half shade	,, ,,	Intense blue	May, Aug.	Cuttings
,, ,, Heavenly Blue	,,	,, ,,	,, ,,	,, ,,	,, ,,	,,
Omphalodes Luciliæ	½	,, ,,	,, ,,	Sky blue	,, ,,	Seeds
Onosmas (all)	½–1	Sunny fissures	Gritty loam	Yellow and white	May, July	Cuttings
Ourisia coccinea	¾	Half shade	Peaty loam	Scarlet	May, June	Division
Oxalis lobata	¼	Sun	Sandy loam	Golden	Sept., Oct.	,,
Phlox subulata, in variety ..	Prostrate	Open	,, ,,	Various	May, June	Cuttings
Phyteuma comosum	¼	Sunny	Limestone fissures	Blue	,, ,,	Seeds
Primula farinosa and alba ..	¼	Shade or root moisture	Rich vegetable soil	Various	April, May	,,
,, frondosa	¼			,,	,, ,,	,,

FIG. 35.—A WELL-FLOWERED COLONY OF GENTIANA FREYNIANA.

Fig. 36.—A Rare Saxifrage (Saxifraga Grisebachii)

ALPINE PLANTS FOR SUNNY AND SHADY POSITIONS (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Primula involucrata	½	Shade or root moisture	Rich vegetable soils	Various	April, May	Seeds
,, rosea	1			,,	,, ,,	,,
,, scotica	¼			,,	,, ,,	,,
,, viscosa and others ..	¼-½	Partial shade	Limestone soils	,,	April, June	,,
Ramondia pyrenaica	½	Cooling shade, or sun and moisture	Peat, leaf soil and sand	Light purple	May	Seeds (all)
,, ,, alba ..	½			White	,,	,, ,,
,, ,, rosea ..	½			Rose	,,	,, ,,
,, serbica Nathaliæ ..	½			Mauve	,,	,, ,,
Saxifraga (all encrusted and allied sorts) (Fig. 36)	Various	Sunny	Sandy loam and old mortar	White	Mar., June	Seeds, division and cuttings
Saxifraga (all mossy sorts) ..	½-¾	Open or partial shade	Moist loam	White or red	Mar., May	Division, cuttings
Schizocodon soldanelloides ..	¼	Light shade	Peaty soil	Pinky white	May	Division
Shortia galacifolia	½	,, ,,	,, ,,	Pink	April, May	,,
,, ,, rosea ..	½	,, ,,	,, ,,	Rose	,, ,,	,,
,, uniflora	¼	,, ,,	,, ,,	Pinky white	,, ,,	,,
,, ,, grandiflora ..	½	,, ,,	,, ,,	,, ,,	,, ,,	,,
Soldanellas (any)	¼	Open	Moist loam	Purplish	Mar., April	,,
Viola pedata and alba	¼	Shade	Moist peat	Purple or white	May, June	Seeds

CHAPTER XV

BULBOUS AND TUBEROUS ROOTED PLANTS

IF we look to the greater array of tufted and other alpines for providing the richer floral wealth of the rock garden, no matter what the season of the year, there still remains a few—a notable minority it may be—which, embraced under the above heading, cannot well be ignored. Viewed collectively they might be said to constitute an interesting assembly, though, if regarded in greater detail, the interest develops into importance. To get an idea of their variety and the lengthy season covered by their flowering we have but to recall the winter Aconite, Snowdrop, early bulbous Irises, winter, spring and autumn flowering Crocuses, the richness of the Chionodoxas budding as it were with the melting snow, the exquisite charm of certain Anemones, particularly those allied to the Grecian Windflower (A. blanda) our own Wood Anemone (A. nemorosa), than whose sky-blue forms the genus holds nothing half so precious to the spring gardener. There is beauty also both of leaf and blossom in the spring and autumn flowering Cyclamen, such extensive groups as the Fritillaries and Dog's Tooth Violets adding quaintness or interest over a very considerable period. Apart from these is the grace and charm of "Wood Lily" (Trillium) and the unusual vigour of the meadow Saffrons (Colchicums), the two genera while rich in variety flowering at widely diverse seasons of the year. Then, without greatly straining a point, one might include the well-known Primula Sieboldi, which, if neither bulbous or tuberous rooted, is certainly rhizo-

FIG. 37.— AMERICAN COWSLIPS OR SHOOTING STARS (DODECATHEON MEADIA).

Fig. 38.—The Spring Snowflake (Leucojum Vernum).

matous, and, being in other respects suited to the rock garden, might well be admitted within the scope of the present work.

Happily, too, in the plants we have in mind, there are those suited to dry and moist places, likewise to sun or shade, hence it would be easy enough to distribute a selection of bulbous and allied plants far and wide. For example, nearly or all the Crocuses revel in comparative soil warmth and sunlight, to which latter the flowers are ever ready to respond. The same might well be said of the brilliantly flowered Anemone fulgens in all its forms, and in slightly modified degree of the Grecian Windflower (A. blanda) and its lovely blue and white variety, A. b. scythinica. The exquisite Anemone nemorosa Alleni and A. n. Robinsoniana, revellers in thin woodland shade and moist, as well as rich soils, are reserved for affording beauty spots in quite another direction, and the bog bed chiefly built for the accommodation of the Mocassin flower (Cypripedium spectabile) might well be carpeted with these and their kindred to flower ere the principal occupants of the bed are half awakened from their winter's sleep. The Anemones are not peat lovers as is the Lady's Slipper named; they prefer rich loam freely mingled with vegetable soil, leaf mould and the like, while the moisture, which is so much to them, should never be absent from January to December. Indeed, under no other conditions is one half of the charm of these precious spring flowers revealed. The charm, too, strengthens with the years; increased stature following on the heels of the established plant, and with it blossoms almost twice as large as those produced in the first year of flowering. Hence culture of the right kind merits every attention and care, so that the best the plant is capable of giving may be ours at will. The whole of the bulbous plants named should be planted in early autumn, although that is the season of flowering of not a few of them. The following list will give some idea of the not inconsiderable variety of bulbous plants suitable for the rock garden:

SELECTION OF BULBOUS ROOTED PLANTS.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Allium pedemontanum ..	¾	Open	Sandy loam	Dull red	June	Seeds, division
Anemone blanda	½	Sunny	Rich loam	Blue	Feb., April	Seeds
,, ,, scythinica ..	½	,,	Rich light loam	Blue and white	Mar., April	,,
,, nemorosa Allenii ..	½	Sunny or light shade	Moist loam	Sky blue	April	Division
,, ,, Robinsoniana	½	,, ,,	,, ,,	,, ,,	,,	,,
,, ranunculoides ..	¼	,, ,,	,, ,,	Yellow	Mar., April	,,
Chionodoxa Luciliæ	¾	Open	Sandy loam	Blue and white	Feb., Mar.	Seeds
,, ,, alba ..	¾	,,	,, ,,	White	,, ,,	,,
,, sardensis	¾	,,	,, ,,	Deep blue	,, ,,	,,
Colchicum speciosum	1	,,	Deep loam	Rosy lilac	Sept.	Division
,, ,, album ..	1	,,	,, ,,	Pure white	,,	,,
Crocus asturicus	¼	,,	Sandy loam	Violet	,,	Seeds
,, medius	½	,,	,, ,,	Deep lilac	Sept., Oct.	,,
,, nudiflorus	¾	,,	,, ,,	Lilac	Aug., Sept.	,,
,, Sieberi	¼	,,	,, ,,	,,	Feb., Mar.	,,
,, speciosus	¾	,,	,, ,,	Purplish blue	,, ,,	,,
,, zonatus	½	,,	,, ,,	Rosy lilac	,, ,,	,,
Cyclamen coum and album ..	¼	Half shade	,, ,,	Red and white	Feb., Mar.	,,
,, ibericum	¼	,, ,,	,, ,,	Red	,, ,,	,,
,, neapolitanum ..	¼	Open or shade	,, ,,	,,	Sept.	,,
Dodecatheons (all) (Fig. 37) ..	½–1	Half shade	Peat and loam	Red and white	Spring	Division
Eranthis hyemalis	½	Woodland or shrub shelter	Chalky loam	Yellow	Jan.-Mar.	,,

SELECTION OF BULBOUS ROOTED PLANTS (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Erythronium (Dog's Tooth Violet) (all)	¼–1	Light shelter	Sandy loam	Various	Spring	Seeds
Fritillaria aurea	½	Open	Sandy peat	Golden	April, May	,,
,, meleagris, in variety	1–1½	,,	Moist loam	Various	Mar., April	,,
,, pyrenaica	¾	,,	,, ,,	Purplish	May, June	,,
Galanthus Elwesii	¾	,,	,, ,,	White	Feb., Mar.	,,
,, Ikariæ	½	,,	,, ,,	,,	March	,,
Iris persica Heldreichii ..	½	Light shelter	Sandy loam	Violet-blue	Mar., April	,,
,, reticulata	¾	,, ,,	,, ,,	Royal purple	March	,,
Leucojum vernum (Fig. 38) ..	½	Open	,, ,,	White	Mar., April	Seeds, division
Muscaria botryoides, in variety	½	,,	,, ,,	White and blue	April	,, ,,
Narcissus cyclamineus ..	½	,,	Moist loam	Yellow	Mar., April	,, ,,
,, moschatus	½	,,	Sandy loam	Cream white	April	,, ,,
,, triandrus, in variety	¾	,,	Peat and loam	,, ,,	Mar., April	Seeds
Puschkinia libanotica compacta	½	,,	Sandy loam	Porcelain blue and white	April	Seeds, division
Scilla bifolia, in variety ..	½	,,	,, ,,	Various	,,	,, ,,
,, sibirica, in variety ..	¼	,,	,, ,,	Blue and white	Mar., April	,, ,,
Trilliums (all)	½–1	Shady	Peat and loam	Various	April, May	Seeds
Tulipa bifolia major	¾	Open	Sandy loam	White and yellow	April	Division
,, Kaufmanniana	¾	,,	,, ,,	White and scarlet	,,	Seeds
,, ,, aurea ..	¾	,,	,, ,,	Yellow	,,	,,

CHAPTER XVI

EFFECTIVE PLANT GROUPING FOR VARIOUS SEASONS

THERE would appear to be an increasing desire on the part of the owners of gardens—born, doubtless, of the period during which they are in residence in town or country—to have their rock gardens, as, indeed, all other parts of the garden, as effective as possible at such times. The idea is both natural and legitimate. Of necessity, however, in such instances, the greater variety of plants available have to give way to a limited number whose flowering can be relied upon when required. In accomplishing this it almost invariably happens that the choicer gems of crevice and fissure are displaced by others capable of a greater display, those, like the Aubrietias, alpine Phloxes, or Gentianella, that afford pictures of colour—veritable sheets or carpets of flowers—for weeks together. Such as these, indeed, may be made much of in the hands of the intelligent plant grouper; he who, being quick of discernment and of an artistic temperament, will fashion his groups accordingly, and, while avoiding formality—the usual failing in these cases—secure pleasing harmonies or striking contrasts in a way which commands attention at once. Such an one will not blaze forth all the colours of the rainbow in rapid succession on a solitary bank or slope to constitute one huge incongruous whole. Preferably will he dispose his groups in massed battalions where the effect will be whole-hearted, complete, invulnerable. In such cases the colour groups, unless agreeably harmonising, should not run one into the other; rather should they

cease to be at a certain point, then a foil, a rest for the eye, and presently a complete change. If, for example, the plant grouper were working with such well-known subjects as Aubrietia Dr. Mules and Saxifraga camposii (Wallacei), violet-purple and pure white respectively, on a single bank or slope, the termination of the one should be determined by a depression by the intervention of an irregular, undulated grassed bank of sufficient proportionate size to catch the eye, to act as a foil, and to mirror into greater life and beauty what is above and beyond. The marginal termination of any such grouping should never be formal or rounded as though moulded into shape; a broken line fashioned by the presence of rock here and there will be much more in keeping, and the plants presently finding their way over them will afford a picture as nearly ideal as any true landscape gardener could desire. That the lower or succeeding groups in such arrangements should not be in slavish imitation of the first is a warning hardly needed after what has been urged against formality; indeed, each group, whether large or small, might well provide a feature alone.

Generally, it will be found advisable in the case of families of plants—*e.g.*, Aubrietias and subulata Phloxes—containing many varieties each, to work with the more distinct, the best results being secured in that way. Such indispensable rock gardening subjects as Saxifragas apiculata, Elizabethæ, and sancta (yellow-flowered), and Burseriana Gloria (white-flowered) will be found invaluable in the winter or spring section, while the many forms of S. cotyledon and C. cochlearis will fittingly represent the genus during the summer months. For both the spring and summer sections there is a great wealth of material awaiting intelligent use.

For the Rock Garden in Autumn there is a lesser wealth of material, though the variety is greater than many suppose. In the past, generally speaking, the best use has not been made of the things that exist.

For some years, however, there has been an increased demand for autumn-flowering plants for the rock garden, and specialists are as keen in their desire to have the best at this season as at all others. We rejoice at the fact, inasmuch as an extended season of flowering or gaiety at such a time will not merely provide an increased interest in the department, but furnish a useful opening for the would-be raiser of new plants who is ever-seeking "for fields and pastures new." Just now there is a demand—not calculated to be a transient one—for alpine plants flowering in autumn, and with the demand the supply will presently come. Meanwhile, we can make the best use of what we possess, and by planting them in bolder groups or masses, or even endeavouring to make autumn rock-gardening a feature, be playing our part with the rest. In this direction we shall find some of the hardy Heaths of great service, as much by their dwarfness and freedom of flowering as by their amenableness to the work we have in mind.

In the subjoined lists of plants it may be noted that some of the plants occur in more than one season. This is frequently the result of a prolonged period of flowering. Where such is the case the flowering of the subject at the period indicated may be accepted as fairly reliable. In others the time of flowering should be regarded as approximately correct, much depending upon locality, position, and the varying seasons. To render the lists of greater service for ready reference we have given the plants in their seasons:

EFFECTIVE PLANT GROUPING FOR THE SPRING SEASON.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Adonis amurensis	1	Sunny	Rich loam	Yellow	Feb., April	Seeds, division
,, ,, fl.-pl. ..	1	,,	,, ,,	Yellow and green	,, ,,	,, ,,
,, vernalis	1	,,	,, ,,	Yellow	April	,, ,,
Alyssum saxatile compactum ..	1	,,	Garden soil	,,	Mar., April	Seeds
Anemone apennina	½	,,	Sandy loam	Blue	,, ,,	,,
,, blanda	½	,,	,, ,,	,,	Mar., May	,,
,, ,, scythinica ..	¼	,,	,, ,,	Blue and white	Mar., April	,,
,, Hepatica, in variety	¾	Half shade	,, ,,	Red, white, blue	April, May	Seeds, division
Arabis albida, fl.-pl.	¾	Open	Garden soil	White	,, ,,	Cuttings
Aubrietias (any)	Carpeter	,,	,, ,,	Various	,, ,,	,,
Cheiranthus alpinus	¾	,,	,, ,,	Yellow	,, ,,	,,
Chionodoxa Luciliæ	½	,,	Sandy soil	Blue	Feb., Mar.	Seeds
,, sardensis	½	,,	,, ,,	Deep blue	,, ,,	,,
Cyclamen coum	¼	Half shade	,, ,,	Red	,, ,,	,,
Draba aizoides	¼	Sunny	Gritty soil	Yellow	Mar., April	,,
Erica (Heath) carnea	¾	Open	Peat and loam	Red	Feb., May	Division
,, ,, ,, alba ..	¾	,,	,, ,,	White	,, ,,	,,
Gentiana acaulis	¼	Sunny	Sandy moist loam	Blue	April, June	,,

EFFECTIVE PLANT GROUPING FOR THE SPRING SEASON (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Morisia hypogæa	Prostrate	Sunny	Sandy peat	Yellow	Feb., Mar.	Seeds
Phlox amœna	½	,,	Sandy loam	Red	April, May	Division
,, subulata, in variety ..	Procumbent	,,	,, ,,	Red, white, lilac	,, ,,	Cuttings
Primula denticulata, in variety ..	¾	Shade	Moist loam	Purple and white	,, ,,	Seeds
Ramondia (all the kinds) (Fig. 39)	½	,,	Sandy peat	Various	May	,,
Saxifraga apiculata and alba ..	½	Open	Sandy loam	Yellow and white	Jan., April	Division
,, Burseriana gloria ..	¼	Sunny flank of rock	Gritty soil	White	Feb., Mar.	,,
,, ,, major ..	¼	,, ,,	,, ,,	,,	,, ,,	,,
,, Elizabethæ	¼	Open	,, ,,	Yellow	,, ,,	,,
,, oppositifolia, in variety	Procumbent	,,	,, ,,	Red and white	,, ,,	,,
,, Rhei, Guildford Seedling and Clibrani (all mossy sorts)	¼–½	,,	Moist loam	Red flowered	April, May	,,
,, sancta	¼	,,	,, ,,	Yellow	Mar., April	,,
,, camposii (Wallacei) ..	½	,,	,, ,,	Pure white	June	,,
Tiarella cordifolia	1	,,	,, ,,	Cream	May	,,

N.B.—It should be noted that in the genus Saxifraga alone there are some dozens of other kinds flowering in spring. Those named, however, are excellent for display purposes.

FIG. 39.—RAMONDIAS IN A SHADY ROCK GARDEN.

FIG. 10.—A CHARMING PLANT FOR THE SUMMER ROCK GARDEN (ANDROSACE LANUGINOSA).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Acæna Novæ-Zelandiæ	Prostrate	Sunny	Loam	Crimson	June, Aug.	Division
Achillea Clavennæ	½	,,	Sandy loam	White	June, July	,,
,, rupestris	½	,,	,, ,,	,,	,, ,,	,,
,, tomentosa	½	,,	Moist loam	Yellow	June, Aug.	,,
,, umbellata	½	,,	Sandy loam	White	June, July	,,
Ajuga Brockbankii	½	Open	Loam	Blue	,, ,,	,,
Androsace lanuginosa (Fig. 40) ..	Trailing	Sunny	Sandy soil	Pink and white	June, Aug.	Cuttings
,, ,, Leichtlinii	,,	,,	,, ,,	,, ,,	,, ,,	,,
Aquilegia cærulea	½–¾	,,	,, ,,	Blue	June, July	Seeds
,, glandulosa	½–¾	,,	,, ,,	,,	,, ,,	,,
,, Stuartii	½–¾	,,	,, ,,	,,	,, ,,	,,
Armeria maritima Laucheana ..	¾	Open	,, ,,	Red	,, ,,	Division
Campanula G. F. Wilson ..	½	,,	Moist loam	Violet-purple	July, Sept.	,,
,, garganica (vars.) ..	Prostrate	,,	,, ,,	Blue and white	,, ,,	,,
,, muralis	½	Sunny	,, ,,	Blue	June, July	,,
,, Profusion	Trailing	Half shade	,, ,,	Sky blue	Aug., Sept.	,,
,, pulla	¼	Cool spot	,, ,,	Imperial purple	June, July	,,
,, pusilla, in variety ..	½	,, ,,	,, ,,	Blue and white	July, Aug.	,,
,, ,, Miss Willmott	½	,, ,,	,, ,,	Pale blue	,, ,,	,,
Coronilla iberica	Procumbent	Open	Loam	Yellow	,, ,,	,,

EFFECTIVE PLANT GROUPING FOR THE SUMMER SEASON (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Crucianella (Phuopsis) stylosa ..	½	Open	Loam	Reddish	July, Sept.	Division
Dianthus alpinus	¼	Sunny	Gritty soil	Red	June, July	Seeds
,, cæsius	½	,,	,, ,,	Rosy	,, ,,	,,
,, glacialis	¼	,,	,, ,,	Rose-crimson	,, ,,	,,
,, neglectus	¼	,,	,, ,,	Rosy red	,, ,,	,,
Edraianthus serpyllifolius ..	Trailer	Half shade	Moist gritty soil	Royal purple	,, ,,	,,
Gentiana septemfida	½	Cool spot	Peat and loam	Blue	Aug., Sept.	,,
Gypsophila cerastioides	¼	Open	Sandy soil	White	June, July	Division
Hutchinsia (Noccaæ) alpina ..	½	,,	,, ,,	,,	July, Aug.	,,
Iberis correæfolia	¾	,,	Garden soil	,,	June, July	Cuttings
,, sempervirens	Trailing	Sunny	,, ,,	,,	,, ,,	,,
Leontopodium alpinum (Edelweiss)	½	,,	Limestone soil	,,	July, Aug.	Seeds
Lithospermum prostratum ..	Trailing	Open	Sandy peaty soil	Blue	July, Sept.	Cuttings
,, ,, Heavenly Blue	,,	,,	,, ,,	,,	,, ,,	,,
Ourisia coccinea	¾	Half shade	Moist loam	Scarlet	June, July	Division
Phlox divaricata (Fig. 41) ..	1	Open	Loamy soil	Bluish	,, ,,	Cuttings

Fig. 41.—Phlox Divaricata growing on a Bank.

Fig. 42.—A Beautiful Primula for the Rock Garden (P. Pubescens Alba).

EFFECTIVE PLANT GROUPING FOR THE SUMMER SEASON (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Primula farinosa	½	Shady	Moist soil	Lilac	June, July	Seeds
,, marginata	½	,,	Sandy loam	Bluish	,, ,,	,,
,, pubescens alba (Fig. 42)	½	,,	Rich loam	White	June	Division
,, rosea	½	,,	,, ,,	Rose	,,	Seeds
,, viscosa, in variety ..	¼	,,	,, ,,	Various	June, July	,,
Ranunculus amplexicaulis ..	½	Open	,, ,,	White	,, ,,	,,
Saponaria ocymoides alba ..	Trailing	,,	,, ,,	White	June, Aug.	,,
,, ,, splendens..	,,	,,	,, ,,	Rose	,, ,,	,,
Saxifraga aizoon balcana ..	½	,,	Gritty loam	White and pink	July	Division
,, ,, rosea	¾	,,	,, ,,	Rosy red	,,	,,
,, Camposii	¾	,,	Loam	White	June	,,
,, cochlearis	1	,,	Sandy loam	,,	July	,,
,, ,, major ..	1	,,	,, ,,	,,	,,	,,
,, ,, minor ..	¼	,,	,, ,,	,,	,,	,,
,, Cotyledon, in variety	2	Sunny	,, ,,	,,	,,	Offsets
,, lantoscana superba ..	½	,,	,, ,,	,,	June, July	Division
,, longifolia	1½–2 at flowering	,,	Gritty soil	,,	July	Seeds
Thymus lanuginosus	Trailing	,,	,, ,,	Reddish	August	Cuttings
Veronica saxatilis	Carpeter	Open	Moist soil	Blue	June, Aug.	Cuttings, division
,, Teucrium dubia (prostrata)	,,	,,	,, ,,	,,	,, ,,	,, ,,

EFFECTIVE PLANT GROUPING FOR THE AUTUMN SEASON.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Acis autumnalis	¼	Sunny	Sandy loam	Pale pink	Aug., Sept.	Seeds
Atragene (Clematis) alpina ..	Trailing	,,	,, ,,	Blue	,, ,,	,,
,, ,, alba ..	,,	,,	,, ,,	White	,, ,,	,,
Campanula garganica (vars.)..	,,	,,	Moist loam	Blue and white	,, ,,	Cuttings
,, Hendersoni ..	1	Open	Deep loam	Blue	,, ,,	,,
,, muralis (second flowering)	½	,,	Cool loam	,,	Aug., Oct.	,,
,, Profusion	Trailing	Half shade	Moist loam	Sky blue	Aug., Sept.	Division, cuttings
Ceratostigma plumbaginoides	¼	Open	Peat, loam	Blue	Aug., Oct.	Division
Colchicum speciosum	¾	,,	Deep loam	Lilac and white	Sept., Oct.	,,
,, ,, album ..	¾	,,	,, ,,	,, ,,	,, ,,	,,
Crocus speciosus	½	Sunny	Sandy loam	Violet-purple	Aug., Sept.	Division, seeds
,, medius	½	,,	,, ,,	Violet	Sept., Oct.	,, ,,
,, nudiflorus	½	,,	,, ,,	Lilac-purple	Sept.	,, ,,
,, ochroleucus	¼	,,	,, ,,	White	,,	,, ,,
,, zonatus	¼	,,	,, ,,	Lavender	,,	,, ,,
Cyclamen neapolitanum ..	Carpeting	Open	,, ,,	Rose-pink	,,	Seeds
,, ,, album	,,	,,	,, ,,	White	,,	,,
Erica cinerea	¼	,,	Peaty	Reddish	Sept., Oct.	Cuttings, layers

EFFECTIVE PLANT GROUPING FOR THE AUTUMN SEASON (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Erica cinerea alba	¾	Open	Peaty	White	Sept., Oct.	Cuttings, layers
,, ,, atropurpurea ..	¾	,,	,,	Deep purple	,, ,,	,, ,,
,, ,, atrosanguinea ..	¾	,,	,,	Deep red	,, ,,	,, ,,
,, ,, coccinea ..	¾	,,	,,	Bright red	,, ,,	,, ,,
,, ciliaris mawiana ..	¾	,,	,,	Deep red	Aug., Oct.	,, ,,
,, vagans	2	,,	,,	Pink	,, ,,	,, ,,
,, ,, alba and rubra ..	2	,,	,,	White and red	,, ,,	,, ,,
Polygonum affine	¾	,,	Loam	Red	,, ,,	Division
,, vaccinifolium ..	Trailing	,,	Sandy soil	Pink	Sept., Nov.	,,
Sedum Ewersii	Tufted	,,	,, ,,	,,	Sept., Oct.	Cuttings
,, Kamschaticum ..	,,	,,	,, ,,	Yellow	Aug., Sept.	,,
,, pulchellum	¼	,,	,, ,,	Pink	,, ,,	Division
,, Sieboldii	Tufted	,,	,, ,,	,,	,, ,,	,,
,, spectabile, in variety	1–2	,,	Loam	Pink and red	,, ,,	,,
,, spurium, in variety ..	Trailing	Sunny	Garden soil	Various	,, ,,	,,
Sternbergias (all)	½	,,	Sandy soil.	Yellow	,, ,,	Seeds
Zauschneria californica ..	1	,,	,, ,,	Scarlet	Aug., Oct.	Division
,, ,, splendens	1	,,	,, ,,	,,	,, ,,	,,

EFFECTIVE PLANT GROUPING FOR THE WINTER SEASON.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Adonis amurensis	1	Sunny	Rich loam	Yellow	February	Seeds, division
,, ,, fl.-pl.	1	,,	,, ,,	Yellow and green	,,	,, ,,
Crocus Imperati	¼	,,	Sandy soil	Violet	,,	Seeds
,, Sieberi	¼	,,	,, ,,	Lilac-purple	Feb., Mar.	,,
,, ,, versicolor	¼	,,	,, ,,	Various	,, ,,	,,
Cyclamen cilicicum	¼	Half shade	,, ,,	White and red	,, ,,	,,
Eranthis hyemalis	½	Open	,, ,,	Yellow	Jan., Feb.	Division
,, cilicicus	½	,,	,, ,,	,,	,, ,,	,,
Galanthus (Snowdrop). All ..	½	Shade	Loamy soil	White	,, ,,	Seeds
Helleborus niger (Christmas Rose). All the forms	½–¾	Light shade	,, ,,	,,	Nov., Feb.	Division
Hyacinthus azureus	¼	Open	Sandy soil	Blue	Feb., Mar.	Seeds
Iris reticulata	½	Sheltered	,, ,,	Violet and gold	,, ,,	,,
Saxifraga apiculata (Fig. 43) ..	½	Open	,, ,,	Yellow	Jan.-April	Division

FIG. 43.—A COLONY OF SAXIFRAGA APICULATA.

Fig. 44.—The Cotton Lavender (Santolina Chamæcyparissus).

CHAPTER XVII

SHRUBS IN THE ROCK GARDEN

THERE is probably no aspect of rock-garden equipment requiring greater consideration from the gardener than this, and none to which the usual run of text-book recommendations apply with less force or directness. The inclusion of shrubs, chiefly of the coniferous order, may be desirable enough, or even essential, but to what extent they may be employed will, of necessity, depend upon the size or limitations of the rock garden itself, and not a little also upon the nature of its surroundings. In no circumstance, however, should shrubs play a conspicuous part. Much less should they appear in columnar form at regular intervals, an offence to the eye, and an evidence of the bad taste of the operator. In a word the shrub of columnar outline should find no place in *our* rock garden, since it will not merely rob the soil in its vicinity, but will ruin the soil quite near by reason of the unparalleled dryness which would prevail. Hence we require none of these. What we might tolerate, and what also would be capable of doing good service whilst imparting diversity or affording character to the whole, are the dwarf, compact or pigmy growing forms of such shrubs, of which a few are of considerable importance. Golden-leaved or variegated subjects should never be used; their sickly presence is not required. Occasional examples of Yucca, as recurva, angustifolia and filamentosa, behind or at the summit of a rock; or a drooping or bush-formed Cotoneaster or Berberis might each do good service, while in certain circumstances a dwarf tree Ivy would not be out

of place. Everything, as we have already stated, depends upon environment, and, of course, the disposition of the plants themselves. Herein, indeed, lies the true value of the shrub in its relation to the rock garden; a plant, while destined only to play a minor part, plays that part exceedingly well by adding variety and, perhaps, picturesqueness of a kind to the whole. Occasionally, too, the dark, sombre tints of the shrubs pressing closely to rock are of assistance to the plant grouper, the effect of white-flowered groups of plants particularly being enhanced by their near presence. In these and in other ways, therefore, there is room for the shrub, and there is work for it to do. The following lists will give readers a good idea of the best kinds of shrubs for the rock garden:

SELECT SHRUBS (CHIEFLY EVERGREEN).

N.B.—Those genera marked by an asterisk are also of value for their flowers.

Abies balsamea globosa
,, ,, Hudsonica
,, (Picea) excelsa clanbrasiliensis
,, ,, excelsa conica
,, ,, excelsa compacta
,, ,, excelsa Gregoryana
,, ,, excelsa pumila glauca
,, ,, excelsa pygmæa
,, pectinata nana
,, Remontii
,, sub-alpina compacta
*Andromeda (Cassiope) tetragona
*Cassinia fulvida
Cotoneaster adpressa (Berry bearing)
,, congesta (Berry bearing)
,, horizontalis (Berry bearing)
,, humifusa (Berry bearing)
,, microphylla (Berry bearing)
,, thmyæfolia (Berry bearing)
Cryptomeria japonica compacta
Cupressus filifera glauca
,, Lawsoniana nana
,, Lawsoniana minima glauca
,, Lawsoniana lycopodioides
,, thyoides leptoclada
*Daphne Blagayana
*,, cneorum
Escallonia Langleyensis
Gaultheria procumbens (Berry bearing)
Hedera minima
Ilex (Holly) crenata
,, Pernyi
Juniperus canadensis nana
,, Hibernica compressa nana
,, sabina prostrata
,, ,, tamariscifolia
,, tripartita

*Lavandula compacta
*Othonnopsis cheirifolia
Pinus cembra pumila
,, strobus nanus
,, ,, pumila
,, ,, tabulæforme
,, sylvestris compacta argentea
Retinispora obtusa nana
,, ,, compacta
,, Sanderi
,, squarrosa
,, tetragona aurea
Santolina Chamæcyparissus (Fig. 44)
Taxus adpressa
,, Dovastonii pendula
,, nana
,, repandens
Thuya dolobrata nana
,, occidentalis Elwangeriana
Thuya occidentalis Little Gem
,, ,, Späthii
,, orientalis aurea nana

Veronica Armstrongi
* ,, buxifolia
,, carnosula
,, cupressoides
,, decumbens
,, glabra-cœrulea
,, Guthrieana
,, Hectori
,, loganoides
,, pimelioides
,, ,, minor
,, pinguifolia
,, salicornioides
,, Stuarti

*Yucca angustifolia (Fig. 45)
,, filamentosa
,, pendula
,, recurvifolia

SELECT FLOWERING SHRUBS FOR THE ROCK GARDEN.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Azalea indicum amoenum ..	1–3	Half shade	Peaty	Rosy red	Spring	Cuttings
Berberis empetrifolia	1–2	Open	Ordinary	Orange	May	Seeds, cuttings
,, Wilsonii	1	,,	Sandy loam	—	Red fruits in Autumn	Seeds
Cistus florentinus	3	,,	Loam	White	Summer	Cuttings
,, lusitanicus	3	,,	,,	Yellow	Aug., Sept.	,,
Cytisus Kewensis	1½	,,	,,	Creamy	Spring	,,
,, præcox and albus ..	3–5	,,	,,	Yellow and white	,,	Seeds, cuttings
Daphne Mezereum, in variety ..	1–2	,,	,,	Red and White	March	Seeds, grafts
Erica carnea and alba	¾	,,	Peaty loam	,, ,,	Spring	Layers, cuttings
,, cinerea	½	,,	,, ,,	Purplish	Autumn	,, ,,
,, ,, alba	½	,,	,, ,,	White	,,	,, ,,
,, ,, in variety	½	,,	,, ,,	Red chiefly	,,	,, ,,
Fuchsias (hardy sorts)	1–3	,,	Loam	Scarlet	Summer, Autumn	Cuttings
Genista tinctoria, fl.-pl.	Subprostrate	,,	,,	Yellow	May, Aug.	,,
Ononis fruticosa	1–2	,,	,,	,,	June, Aug.	Cuttings, seeds
Rhododendron ferrugineum ..	1½	Half shade	Peaty soil	Rosy red	May, June	Cuttings, grafts
,, ,, album	1½	,, ,,	,, ,,	White	,, ,,	,, ,,
,, racemosum ..	2	,, ,,	,, ,,	Pink and white	,, ,,	,, ,,
Rhodora canadense	2–3	,, ,,	,, ,,	Purplish	,, ,,	Cuttings
Rosa rugosa (for large places) ..	2–5	Open	Ordinary	Reddish	Summer	,,
Spiræa arguta	2–3	,,	,,	White	Spring	,,

CHAPTER XVIII

HEATHS IN THE ROCK GARDEN

THE hardy Heath—the term is used advisedly to separate those common to our own land and countries equally cold from those inhabiting South-west France, Spain and Portugal—is a host in itself, and to-day no garden of any pretensions is complete without a well-equipped Heath garden of its own. For some years these plants have been winning their way into favour with the result that we see broad stretches of them in many directions; now as fringes or borderings, sometimes massed in beds, on the lawn or playing the part of carpeters to plants of taller growth, though best of all, perhaps, apart from the heath garden itself, when employed as a groundwork to choice shrubs, constituting great belts to the shrubbery, or flanking the entrances to the rock garden in their own inimitable way. There is only one way of dealing with these plants in gardens if we would get more than a fractional part of the beauty and colour warmth they are capable of giving, and that is to group them freely in masses. In no other way are they of half the value, and the fact is writ large on peaty waste and moorland in many parts of these islands. It is, indeed, due to the heath alone that thousands of acres of British landscape are beautiful year by year by plants inimitable in colour effects, and in their powers of endurance while growing in the poorest of soils. In these, indeed, they brave the fiercest summer sun we experience; though, in all probability, their own spread and density of growth shield them from much harm in the direction indicated.

In respect of soils, however, the gardener need not fall into the too common error of slavish imitation. In Nature these plants almost invariably inhabit peaty and sandy wastes, though they not infrequently take to other soils usually deficient in lime just as kindly, or even more so. A case in point occurs at Gravetye, Sussex, where Mr. Robinson for many years has had a heath garden upon cool, loamy soil, without a particle of peat added or otherwise, and not much sand; and it may be said of the plants that they appear to revel in it—from those of dwarfest stature to the Portuguese Heath whose handsome bushes attain six to eight feet. In this respect they may be compared to not a few alpine plants which are quite indifferent as to the soil or geological formation on which they grow in Nature.

Generally speaking, however, peat will be found desirable where a heath garden is in course of formation. Very fine, sandy peat, as much of the one as the other, will be found the best or even with a small percentage of loam added—that of a poor or stony nature for preference. Within the limits of the rock garden a similar mixture will do quite well. In no circumstance should rich soil be provided. It is never wanted by the plants, and in all probability would tend to an excess of growth at the expense of flowers. Firmness of soil about the roots of the plants is also an essential to success, and rarely, indeed, are they seen to be happy without it. Firm soils, too, assist in retaining the character of the plants, and all the Heath tribe, whether greenhouse or hardy, delight in these conditions.

A Not Infrequent Error when growing these heaths in the rock garden, or in conjunction therewith, is that of piling up much rock and setting solitary examples between the stones. One such, in the mind's eye, was of a two-sided character and raised several feet out of the ground, the heaths like specks over all. This should never be. The excess of dryness by wind and exposure would almost always be fatal to success, and in any case

good effect would be non-existent. Far better that a rocky bank had been formed than these tons of rock piled high, demonstrating but one thing—*what not to do*. Then, whether in the rock garden or elsewhere, the plants should appear in visible groups or masses, not pocketed here and there in isolation. To what good effect we might use them will depend upon the size and extent of the erection. If small—say under a quarter of an acre—a few groups of some of the more distinct should suffice. Frequently on the upper reaches of the rock garden, where tall herbaceous plants appear unhappily placed, these heaths would constitute the best possible adornment—garniture of a type unequalled from January to December. For not only is there the beauty of flowering, there is a charm of leaf and colour warmth even from the dried and withered flowers which is acceptable at other times. The best general planting season is the autumn. Unless in favoured districts the more tender sorts, lusitanica (Portuguese Heath), Arborea, Mediterranea and its varieties, and the newer Veitchi should not be used. Moreover, their taller growth, often six to ten feet high, unfits them for use in the rock garden generally.

GOOD HARDY HEATHS FOR THE ROCK GARDEN.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*	*Predominant Colour.*	*Flowering Period.*	*Method of Increase.*
Erica carnea (Winter Heath)	¾	Open	Peaty	Reddish	Feb., May	Layers and cuttings
,, ,, alba	¾	,,	,,	White	,, ,,	,, ,,
,, ciliaris mawiana ..	1½	,,	,,	Deep red	July, Oct.	,, ,,
,, cinerea	1½	,,	,,	Reddish-purple	May, Aug.	,, ,,
,, ,, alba	1½	,,	,,	White	,, ,,	,, ,,
,, ,, atropurpurea ..	1½	,,	,,	Deep purple	,, ,,	,, ,,
,, ,, atrosanguinea	1½	,,	,,	Deep red	,, ,,	,, ,,
,, ,, coccinea ..	1½	,,	,,	Bright red	,, ,,	,, ,,
,, ,, purpurea ..	1½	,,	,,	Purple	,, ,,	,, ,,
,, ,, rosea	1½	,,	,,	Rose	,, ,,	,, ,,
,, multiflora	1–1½	,,	,,	Red	Autumn	,, ,,
,, Tetralix	1	,,	,,	,,	Summer and Autumn	,, ,,
,, ,, alba	1	,,	,,	White	,, ,,	,, ,,
,, ,, rubra ..	1	,,	,,	Deep red	,, ,,	,, ,,
,, vagans (Cornish Heath)	2	,,	,,	Pink	Aug., Oct.	,, ,,
,, ,, alba	2	,,	,,	White	,, ,,	,, ,,
,, ,, grandiflora ..	2	,,	,,	Deep pink	,, ,,	,, ,,
,, ,, rubra	2	,,	,,	Reddish	,, ,,	,, ,,

Fig. 45.—A Suitable Yucca for the Rock Garden (Y. Angustifolia).

Fig. 46.—Hardy Ferns in the Rock Garden.

CHAPTER XIX

FERNS IN THE ROCK GARDEN

HAPPILY for the rock garden and its adjacent parts there is a wealth of beauty, diversity of form and elegance in the Fern tribe to be found nowhere else in the vegetable world. The plants were obviously intended to attract by their many graces, and whether in the freshness of their spring or early summer toilet or that of maturer autumn days, they rarely fail to play their part. Then, too, there are Ferns to suit all circumstances, giants of the bog like the Royal Fern (Osmunda) that attain to six feet or eight feet high, and miniatures like the Wall-Rue (Asplenium ruta-muraria) of but an inch or two high, that delight in the dry crevices of a wall and to which soil would appear abhorrent. Twixt these extremes, whether of stature, likes and dislikes, are many species and varieties all alike well suited. It is from out of this greater host that the cool, sequestered places of the rock garden may be ornamented and beautified; that the moist or dripping cave may have its quota of living things, or that the drier places may receive their rightful share.

Culturally, it would appear that moisture or dryness plays a more important part than soil, while position must be relegated to third place. For example, to the true bog-loving Ferns, Osmunda and Struthiopteris, moisture is a first essential, and being present the soil may be of a leafy nature or strong loam. On the other hand, to such as the Parsley Fern, Scaly Fern, or Wall-Rue, dryness is important. The commoner sorts, Hart's Tongue and Filix-mas, succeed almost anywhere, though assuming their greater luxuriance in loamy soils

uniformly cool and moist. The vast majority appreciate shade. The perfectly delicate and beautiful North American Maidenhair (Adiantum pedatum), content in cool, almost sunless spots, is prone to be touched by cutting wind or frost in spring, and should be given a sheltered place. It is a quite deciduous species. The dwarf-growing crested Hart's Tongues in many varieties merit attention apart; the intensity of the green shining fronds is noteworthy, and their heavily tasselled and often much divided extremities provide them with a presence of their own. Too much trimness among Ferns in the places we have in mind might prove quite wrong. There is natural protection in the old bronzed fronds, and the Fern quarter is not to be regarded as a flower bed on terrace or lawn. Planting may be done from March to October, though, preferably, during the early spring months, informal grouping, such as that shown in Fig. 46, being desirable.

FERNS FOR THE ROCK GARDEN.

Name.	*Height in Feet.*	*Aspect.*	*Soil.*
Adiantum pedatum	1½	Moist, sheltered	Peat and loam
Allosorus Crispus (Parsley Fern)	½–¾	Dry, shade	Light loam and grit
Asplenium adiantum nigrum ..	½	Partial shade	Loam
,, ruta-muraria	¼	Dry, open	Old mortar and limestone
,, trichomanes	¼	Dry, open	Old mortar and limestone
Athyrium filix foemina capitatum	1½–2	Partial or thin shade	Loam and vegetable soils
,, ,, corymbiferum ..	1½–2	Partial or thin shade	Loam and vegetable soils
,, ,, cristatum	1½–2	Partial or thin shade	Loam and vegetable soils
,, ,, frizelliæ	1½–2	Partial or thin shade	Loam and vegetable soils
,, ,, ,, cristatum	1½–2	Partial or thin shade	Loam and vegetable soils
,, ,, plumosum ..	1½–2	Partial or thin shade	Loam and vegetable soils
,, ,, Victoriæ	1½–2	Partial or thin shade	Loam and vegetable soils
Blechnum spicant cristatum ..	¾	Cool, shady places	Moist loam
,, ,, imbricatum ..	¾	Cool, shady places	Moist loam

FERNS FOR THE ROCK GARDEN (*continued*).

Name.	*Height in Feet.*	*Aspect.*	*Soil.*
Ceterach officinarum	½	Dry walls	Old mortar and rubble
Cystopteris fragilis	½	Dry, shady places	Light loam and leaf soil
,, montana	½		
Lastrea Filix-mas cristata ..	2	Half shade	Loam and leaf soil
,, ,, grandiceps ..	2		
,, ,, Goldieana ..	1½		
,, montana	1½		
,, pseudo-mas cristata ..	2		
,, thelipteris	1		
Onoclea sensibilis	1½–2	Open, wet or boggy places	Loam, peat, and leaf mould
Osmunda Cinnamomea	2		
,, Claytoniana	2		
,, regalis (for boldest places)	4–6		
,, ,, cristata	1½–2		
Polypodium calcareum	¾	Light shade	Chalk soils, leaf mould and loam
,, dryopteris	½		
,, phegopteris	1		
,, vulgare cambricum	1–1½	Light shade, dryish places	Leaf mould and loam
,, ,, grandiceps ..	1–1½		
,, ,, pulcherrimum	1–1½		
Polystichum acrostichoides ..	1½	Half shade	Loam
,, angulare cristatum Wollastonii	2	Partial shade	Loam and leaf mould
,, angulare divisilobum acutum	2		
,, angulare grandidens	2		
,, ,, imbricatum	2		
,, ,, lineare	2		
,, Lonchitis (Holly Fern)	¾	Shade	Sandy loam
Scolopendrium vulgare Coolingii	½–1	Shade and moisture	Leaf soil and loam
,, ,, cristulatum	½–1		
,, ,, crispum Bowdenii	½–1		
,, ,, densum ..	½–1		
,, ,, digitatum	½–1		
,, ,, fissum ..	½–1		
,, ,, grandiceps	½–1		
,, ,, Kelwayi ..	½–1		
Woodsia alpina	½	Partial shade, dry	Sandstone, leaf mould, and loam
,, ilvensis	½		

CHAPTER XX

ANIMAL PESTS OF THE ROCK GARDEN

THE worst of all the insect pests of the rock garden is the ubiquitous slug, and, like the thief, working chiefly in the night, is the most to be dreaded. In mild winters, when little or no frost is experienced, the slug continues actively at work, playing havoc with not a few plants, while threatening to exterminate some the most choice. The rarer Dianthi and Silene never escape his attentions, while choicer morsels, like Omphalodes Luciliæ, have been sorely tried again and again. Many Campanulas, too, when just pushing into new growth, appear to possess for the slug a very special fascination, and in the case of so exquisite a kind as Campanula Waldsteiniana every vestige of life is greedily devoured. During mild winters the slug frequently attacks early flowering plants, the flower buds of the Apiculata, Boydii and Burseriana Saxifrages being particularly subject to attack.

Preventive Measures and Traps.—For choice alpines occupying solitary positions the ordinary perforated zinc collar placed around the plant will often suffice to keep slugs at bay, particularly if it be surrounded by soot, lime, sifted coal ash, or finely broken granite chips, over which they do not like to crawl. Applications of salt or of some of the advertised soil fumigants are effectual destroyers of the slug, though both are dangerous to plant life. Slices of apple or potato or turnip, constitute excellent baits, and frequent examination of them, dropping the pest into a strong solution of salt-water, will get rid of many. The most

effective trap that I know, and which not infrequently draws the pest towards it by reason of the shelter it affords, is a wet or damp sack, or slate or board if these latter can be placed. Slugs revel in uniform moisture, and the wet sack never fails to harbour them. They seek shelter, too, beneath evergreen alpines, Mossy Saxifrage, Aubrietia, Ramondia, etc., and these and like habited subjects should be examined from time to time. Hand picking, slow and irksome though it be, has still to be resorted to. In searching for the slug watch also for its eggs; their destruction will stem the rising flood. The best slug trap we have tested is the V.T.H. This is filled with salt-water and baited with dry bran. It is most effective.

The Short-Tailed Vole is occasionally troublesome, but is by no means comparable to the slug. It is particularly fond of all the Pink tribe, also Campanulas and other plants. As it is capable of doing much mischief in a short time it should never be neglected. The best trap is the small break-back mouse-trap, baited with green food, *e.g.*, Carnation leaves cut into inch long lengths. Occasionally birds at nesting time will carry away whole tufts of mossy or other Saxifragas, which they leave alone if the plants are dusted with matured soot or sprayed with quassia solution to render them distasteful.

APPENDICES

I.—AN ALPHABETICAL LIST OF CHOICE ALPINES

*N.B.—Those marked by an asterisk * are best suited to the small rock garden. Those marked thus † are recommended for cold districts.*

Acantholimon androsaceum
† ,, glumaceum
* ,, venustum
Achillea Clavennæ
* ,, sericea
† ,, rupestris
,, umbellata
*Adonis amurensis
,, ,, fl.-pl.
* ,, pyrenaica
† ,, vernalis
*Æthionema grandiflorum
,, pulchellum
†*Ajuga Brockbankii
†Alyssum saxatile citrinum
,, spinosum
,, ,, roseum
*Androsace carnea
,, chamæjasme
* ,, foliosa
,, helvetica
†* ,, lanuginosa
† ,, ,, oculata
* ,, pyrenaica
* ,, sarmentosa
,, villosa
* ,, ,, chumbyi
†Anemone alpina
,, angulosa
,, blanda
* ,, ,, scythinica
,, Hepatica, in variety
* ,, pulsatilla
* ,, ,, alba
* ,, ,, rosea
* ,, vernalis
†Anthyllis montana
*Aquilegia alpina
,, cærulea
,, glandulosa
* ,, Stuartii
†Arenaria balearia
†Arenaria montana
†Armeria alpina
* ,, cæspitosa
† ,, cephalotes rubra
† ,, ,, rosea
†*Arnebia (Macrotomia) echioides
*Asperula athoa
,, nitida
* ,, suberosa
†*Aster alpinus, in variety
Astilbe simplicifolia
†*Aubrietia Dr. Mules
† ,, Fire King
†* ,, Lavender
†* ,, Leichtlinii
† ,, Mrs. Lloyd Edwards
† ,, Pritchard's A1
Campanula Allionii
†* ,, carpatica White Star
,, cenisia
† ,, G. F. Wilson
* ,, garganica, in var.
†* ,, muralis
,, muralis major (bavarica)
,, profusion
* ,, pulla
* ,, pulloides
† ,, pusilla alba
†* ,, pusilla Miss Willmott (Fig. 47)
,, Raddeana
,, Raineri
* ,, Stansfieldii
,, Waldsteiniana
Ceratostigma plumbaginoides
*Cyclamen, in variety
†Daphne Blagayana
†* ,, Cneorum

FIG. 47.—CAMPANULA PUSILLA MISS WILLMOTT.

FIG. 48.—PHLOX SUBULATA NELSONII.

*Daphne petræa (rupestris)
*Dianthus alpinus
,, cal-alpinus
,, Freynii
†* ,, graniticus
* ,, neglectus
† ,, sylvestris
Douglasia lævigata
*Draba aizoides
,, Dedeana
†Dryas Drummondii
† ,, octopetala
†*Edraianthus (Wahlenbergia) serpyllifolius
Epigæa repens
*Erigeron aurantiacus
Eritrichium nanum
Erodium Reichardi
,, trichomanifolium
†*Gentiana acaulis
,, bavarica
†* ,, septemfida
,, verna
*Geranium argenteum
† ,, cinereum
,, ,, album
†Globularia nana
,, ,, alba
* ,, nudicaulis
*Gypsophila cerastioides
† ,, prostrata
,, ,, rosea
Haberlea Ferdinandi Coburgii
,, Heldreichii
†* ,, rhodopensis
* ,, ,, virginalis
†Horminium pyrenaicum
†*Hutchinsia alpina
*Hypericum ægypticum
,, coris
,, empetrifolium
†*Iberis correæifolia
† ,, Little Gem
,, sempervirens (Fig. 49)
* ,, superba
†*Incarvillea grandiflora
*Iris cristata
,, gracilipes
,, lacustris
Isopyrum thalictroides
†*Leontopodium alpinum (Edelweiss)
Linaria alpina
,, hepaticæfolia
,, pallida
Linnæa borealis
*Linum flavum
Lithospermum graminifolium
,, prostratum
* ,, ,, Heavenly Blue
,, rosmarinifolium
Lychnis lagascæ
*Mazus rugosus
*Morisia hypogæa
Myosotis Rehsteineri
†* ,, rupicola
*Omphalodes cappadocica
,, Luciliæ
Onosma albo-roseum
,, Bourgæi
* ,, echioides
,, tauricum
Origanum Dictamnus
,, pulchellum
†*Ourisia coccinea
*Oxalis adenophylla
,, enneaphylla
,, ,, rosea
Patrinia palmata
*Pentstemon cæruleus
,, glaber
,, heterophyllus
*Phlox amœna
† ,, ovata
†* ,, subulata atropurpurea
* ,, ,, Nelsonii (Fig. 48)
,, ,, Sprite
,, ,, The Bride
* ,, ,, Vivid
*Phyteuma comosum
†Polygala chamæbuxus
,, ,, purpurea
†Polygonum affine
,, vaccinifolium
Potentilla Tonguei
†Primula Bulleyana

Primula calycina
,, capitata
,, Cockburniana
,, denticulata, all forms, including cashmeriana
* ,, farinosa and alba
,, frondosa
* ,, integrifolia
† ,, intermedia, in variety
,, involucrata
* ,, Juliæ
* ,, marginata
,, megaseæfolia
,, Palinuri
†* ,, pubescens alba (nivalis of gardens)
,, pulverulenta
†* ,, rosea
,, Sieboldi, in variety
* ,, viscosa, in variety
†Pulmonaria arvernense
Ramondia Heldreichii (Janka)
†* ,, pyrenaica
†* ,, ,, alba
* ,, ,, rosea
,, serbica
,, ,, Nathaliæ
*Ranunculus amplexicaulis
,, glacialis
†Saxifraga aizoon lutea
†* ,, ,, rosea
†* ,, apiculata
* ,, ,, alba
,, Borisii
* ,, Boydii
* ,, ,, alba
* ,, Burseriana gloria
* ,, ,, major
,, ,, tridentina
,, cæsia
† ,, Camposii (Wallacei)
†* ,, cochlearis
†* ,, ,, minor (valdensis of gardens)
* ,, coriophylla
,, cotyledon (all vars.)
Saxifraga diapensioides
†* ,, Elizabethæ
,, Ferdinandi Coburgii
,, Grisebachii
,, Kestonensis
,, Kyrillii
†* ,, lantoscana superba
,, longifolia
* ,, marginata
,, "mossy" sorts, red flowered
† ,, muscoides purpurea
†* ,, oppositifolia, in var
* ,, paradoxa
* ,, Paulinæ
* ,, Petraschii
†* ,, Salomonii
†* ,, sancta
* ,, scardica obtusa
Sedum corsicum
* ,, Ewersi
,, Kamschaticum
,, ,, fol. var.
,, obtusatum
* ,, pulchellum
,, rupestris
*Sempervivum arachnoideum
* ,, Laggeri
*Shortia galacifolia
* ,, ,, rosea
,, uniflora
* ,, ,, grandiflora
*Silene acaulis
† ,, alpestris
,, Elizabethæ
* ,, Schaftæ
*Soldanella alpina
* ,, montana
†*Thalictrum adiantifolium
†Thymus lanuginosus
,, serpyllum coccineus
Tiarella cordifolia
†Veronica saxatilis
† ,, Teucrium var. dubia (prostrata)
*Viola pedata
* ,, ,, alba
*Wulfenia carinthiaca
* ,, amherstiana
Zauschneria californica

FIG. 49.—THE EVERGREEN CANDYTUFT (IBERIS SEMPERVIRENS).

II.—UNDESIRABLE PLANTS FOR THE ROCK GARDEN

While every gardener will do his utmost to keep out of the rock garden such pernicious weeds as Colt's Foot (Tussilago), Couch Grass, Bindweed, and others that are found frequently existing in the staple soil, there are certain other plants which by reason of their root spread or ever-encroaching habit of growth may be wholly unsuited for association with rocks, and from which, when once established, they cannot well be eliminated. A plant, too, may not be out of place in the larger rock garden, but quite unsuited to the majority of smaller ones. In this connection it is important to remember that the weed of one soil is not necessarily so of all (Convolvulus althæoides is a case in point). In Southern counties on chalky soils it quickly finds its way into every crack and cranny, while in other districts the cultivator can hardly tempt it to grow. The following are to be guarded against. The list is intended to be suggestive rather than exhaustive, and, seeing that plants vary with soils and circumstances, the alert gardener will soon discover for himself whether a newcomer is an undesirable or otherwise.

Achillea millæfolia in any form
Asperula odorata
Calystegia pubescens (vars.)
Campanula rapunculus
Cerastium tomentosum
,, Biebersteinii
Convolvulus althæoides particularly on chalk soils
Coronilla varia
Euphorbia cyparissias
Galium molugo
,, verum
Glechoma hederacea
Hieracium aurantiacum
Muscarias (generally)
Oxalis Corniculata
Petasites (Tussilago) fragrans
Sedum album
,, spurium in variety
Symphytums, of sorts
Tropæolum speciosum
Vancouveria hexandra
Vincas (generally)

III.—CULTURAL NOTES ON ALPINE PLANTS

In the vast, far-reaching range of alpine vegetable life—and that phase of it that, more particularly, is associated with rock gardening—thoughtful and observant gardeners have long since realised that not all the plants coming within its scope respond to like conditions. That must be so. In Nature there are the plants of the upland meadows and pastures, the saxatile species that ever favour rocks, and those of the mountain bog, glacier and moraine. There are, too, the sun-lovers, which appear to revel in all the sun and warmth to which the mountain plant is usually subjected; and that oppositely inclined set—a minority it may be said—that, seeking exclusion therefrom, appear never so happy as when growing in universal shade or in touch with rocks reeking with moisture. To what extent these play a part in the successful cultivation of the subjects concerned may be a moot question, since radical departures therefrom may prove as prolific of successes as of failures. Not too great a stickler for orthodox soil methods in the past, and recognising that there are conditions of mountain life—altitude, snow, clarified air, and brilliant sun-heat—that are impossible to alpine plants in English lowland gardens, I have many times ignored them with not a little success, while others, pinning their faith to them, have failed. Soil conditions, it has been said, can be "imitated at will, but you cannot create an atmosphere." The idea is quite wrong. A southern exposure for a plant may be fatal, a western one ideal; and with success and failure within a yard of each other

who shall say that the mass of intervening material, be it rock or soil, has not "created" the very "atmosphere" needed by some particular plant. The argument is not figurative; instances are in the mind's eye as I write.

Ourisia coccinea supplies an example, and failures are frequent with it. In one instance its owner took me into the wood, where I found a big tuft huddled in a hole. "Get it out and arrange its rhizomes on the surface; wedge stones between them, and give moister soil," was my prompt recommendation, for which the owner never failed to thank me so long as he lived, since it turned failure into complete success. The Ourisia flowers from the tips of the extending rhizomes, and with these virtually on the surface and its roots in cool, moist, rich loam all is usually well. Given these, it does not object to sun-heat, and if periodically divided and firmly replanted in August or September vigour and a good flowering will be maintained. Dense shade and cold, warmth-excluding conditions are not congenial to this fine Chilean subject, and are to be avoided.

In the same wood as the Ourisia and but a few yards away I saw the finest mass of Epigæa repens I ever beheld in cultivation. It was of waggon-wheel dimensions and twice the height and vigour of anything I had met before. The woodland is its home; the light soil in that referred to suited it exactly. Its owner took no credit to himself for its success; he had planted it there unwittingly, having been told it preferred shade. The Shortias may share like conditions, albeit they are not averse to sun if summer moisture is present. Here, however, soil is of importance, since both Epigæa and Shortia dislike lime, and are happiest in sandy loam, leaf soil, and peat.

Ramondias and Haberleas in perfect health afford a further instance of the influence an ideal "atmosphere" creates. Recommended for shady positions in nearly vertical rock crevice or wall, they not infrequently

suffer in them for lack of moisture in summer-time, but even more severely in winter from the combined effects of frosts and piercing winds, which damage the foliage considerably. In such instances, and where no position in the rock garden is calculated to afford complete immunity from their ill-effects, a thin screen of evergreen or shrub to the windward will do much good. If this is not possible, the laying of sprays of English yew or like subject over the plants will modify the ill.

Of the danger accruing from planting everything on a rule-of-thumb principle, Primula rosea is worthy of notice. It is not infrequently included in lists of bog-loving plants, and rightly so. The artificially constructed bog, however, may soon be nothing more than a stagnant pool, the plants in it a complete failure. Where this is experienced, drier conditions afford a remedy. This Primula, however, loves moisture—though is happy enough in that near equivalent, shade with rich soil—but is quite content if the root fibres can just reach it.

The group of Primulas known as Sieboldi affords a further illustration. Recommended years ago by a well-known writer whose practical experience of hardy plant cultivation was not great for "high and dry positions in the rock garden," the remark, copied into books and gardening periodicals galore, has been directly responsible for the miserable caricatures that have become general. No Primula is hardier than P. Sieboldi and its varieties, none revel more in rich soils and uniformly moist conditions, or give a better flower return. They come early, too—April to May, when they are most welcome. Plant the roots 2 inches or more deep in early autumn. Apropos of Primulas, sow all seeds of them while quite fresh—the bog-loving sorts *always on wet soils, and keep them so.*

The Soldanellas are among the most captivating of alpines, but only rarely a success in lowland gardens.

Plants of moist alpine pastures and of the snow-line, they are often drenched with the melting snow in summer and for a long spell in winter dry, snug, and warm. They prefer a mixture of loam, leaf mould, and sand in equal degree. Wet in summer and dry in winter are the best conditions for them. In addition, breaking them up freely in early spring (April) and replanting firmly materially assists the development of flowering crowns. The smaller-growing sorts, S. pusilla and S. minima, are subjects ripe for the Moraine.

Elsewhere, crevice-planting for Kabschia Saxifrages and cushion-like Androsace has been referred to, though it must not be overlooked that applied moisture in summer-time is very essential to the welfare of plants so circumstanced. Success or failure, indeed, might hinge not a little on the preparation of fissure or crevice: their loose or firm soil contents particularly. The artificially constructed fissure is a different thing, presumably, to that formed in Nature, full, it may be, with the choicest fragments of disentegrated rock and *débris*, the accumulations of the centuries, which have played so large a part in consolidating them. Hence firmness of soil contents in the artificially arranged fissure is essential, while a too rapid percolation of moisture may be prevented by a lining of clay placed low down. Otherwise there may be the danger of applied water carrying the finer particles of soil away, leaving the root fibres all but inert in a vacuum.

Cobweb Houseleeks (Sempervivum arachnoideum) are, when well placed, of the highest ornament in the rock garden, and of the simplest possible cultivation. Amid the crevices of grey, vertically disposed rock, or colonised in the hottest and sunniest positions where watering is difficult, no plants are better suited, and, when established, no feature in rock-gardening is of greater interest. The drier and sunnier the place, the more pronounced their characteristic beauty. How they wed themselves to the rock in their true home,

becoming, as it were, an integral part of it, the mountain climber knows full well. These notwithstanding the good places of the rock garden know them all too rarely. Granite rock or limestone is to them all the same, though the sharper contrast comes of the first-named association. They merit planting on a generous scale to mean anything at all.

Then one feels sure that the plant of a certain trailing habit is often enough insufficiently in the mind of the planter of the rock-garden. In the mind's eye are those effective Campanulas, fragilis, Barrelieri and isophylla varieties, which, a little tender or delicate, perhaps, if planted on level areas, are probably rarely considered for other positions. We know of their success—limited, it may be, to southern or favoured gardens—when planted in the dry wall, though the like places of the rock garden rarely know them. Yet the sharply falling gully between rocks suits them well. They drape such places as few other plants can. Drier and protected between rocks, their roots penetrating into recesses behind, they are hardier. For their late flowering and their colour they are alike welcome. For garnishing difficult places they are most desirable. Rooted cuttings put out in spring are the best. Where the above do not respond, C. profusion (both forms) should be tried. They are happier so than on level ground, and fill a gully with a colour all too rare in August and beyond.

Quite of the highest ornament and utility for like places is Edraianthus (Wahlenbergia) serpyllifolius, whose imperial purple bells trailing down a miniature ravine will cause any plant-lover to halt. It is alone; no other within its set or out of it can claim such distinction. It must be raised from seeds, however, and the seedlings planted in spring in order that a good growth may be insured. Gritty loam and leaf mould should form the staple soil, and with chosen bits of weathered rock driven in here and there as planting proceeds to fix soil and plants and make rugged the

way, a typical bit of mountain flower torrent, even though in miniature, should result. All such planting should be *from the bottom upwards:* it is the only way. Dipping the interposing bits of rock at a downward inclination, dew and rain will be arrested and soil retained in position to the advantage of the subject. Associate the plant *with* the rock in all such work—*i.e.*, insert the stone, lay the plant upon it, then the soil. *Avoid the straight gully; the meandering rivulet form is more Nature-like, more fascinating.* By extending the principle to Primula, Saxifrage, or Ramondia, garniture of the best may be secured whether in sun or shade.

Then it may not be amiss in this disjointed chapter to refer briefly to a danger arising from neglect to divide and replant certain subjects periodically. The mound-forming Saxifrages and the mat-forming species—Aizoons and Sancta, for example—are cases in point. The centres of the former are often lifted out of touch with the soil, big patches perishing outright under stress of great heat or prolonged drought. The remedy in each case is free division and low-down planting. All Saxifrages in touch with the soil root anew from the bases of their rosettes, and opportunity should be afforded them for so doing either by division and replanting or by mulching. In the Aizoons the very density of their growth often precludes a liberal flowering; isolation of the rosettes, promoting their subsequent development, making them more prodigal in this respect. These with colonising further the picture-making aspect of the subject.

Not all the best of rock-gardening effects are the result of employing the choicest plants. The yellow Fumitory (Corydalis lutea), with delicate fern-like foliage and yellow flowers, is all but priceless for garnishing a sun-scorched cranny in the rock where but the merest scrap of soil exists; while a few seeds of any of the Erinuses inserted here and there in high-up seams of rock will perform a like function.

Aubrietias, too, are valuable for like positions if judiciously employed. In like manner where a large shelving rock exists Zauschneria would do good service, and a few fresh bits inserted would soon make for effect. On a smaller scale seeds or freshly rooted cuttings of the dwarf-growing glaucous-leaved Dianthi when they have formed their cushions would ever constitute a pretty feature, still better when studded with flowers. They love the rocks, too, and while adorning them well, assist not infrequently by effacing some of the errors of the rock-builder, yawning gaps and the like, which, unfurnished, ever catch the eye, a reflection, to say the least, on thoughtless, unfinished work.

IV.—PRIMULAS (ALPINE AND BOG-LOVING)

No genus of hardy plants surpasses that of Primula for infinite charm, diversity, and utility; for which reasons it has been decided to include a chapter bearing on the cultivation of the more important kinds. In order, too, to render this chapter of greater service, it has been divided into two parts as suggested above. It may be, however, that in some degree, here and there, the twain will be so closely linked together as to appear inseparable, since it is an incontestable fact that a large number of the bog-loving kinds are "alpine" in the truest and widest sense. The main object in mind, however, is to differentiate between those dwarf-growing species so eminently fitted for cultivation in the rock garden, be it large or small, and that glorious race of moderns, denizens largely of the boggy mountainous regions of the Chinese Alps, which, by reason of stature, boldness, wondrous flowering, and prolific seed-production, are better adapted for gardening on a more lavish scale in woodland places or wherever congenial conditions obtain.

Rock Garden Kinds

These are of lowly stature and well suited for colonising with a free hand. Most interesting among them is the yellow-flowered alpine Primula, P. auricula, one of the parents of the great race of garden-raised Auriculas. It is valuable, too, by reason of vigour and hardiness, while of that arborescent stemmed type which needs attention periodically in order to retain perfect health. Succeeding in cool

rich loam, it will be seen that the stems lose their leaves and that embryo roots are presently formed above the soil. By burying the stems when replanting, these roots take hold of the soil, and the vigour of the subject is maintained. This is true, also, of the Auricula, and such Primula species as P. marginata, P. Palinuri, and others having stem-like growths. Other species which respond to cultivation in rich, well-drained loam with which leaf soil and grit is freely incorporated are P. calycina, lilac; P. clusiana, rose; P. hirsuta in all its forms; P. integrifolia, purplish rose; P. spectabilis; and others. These are but a few inches high, and produce their flowers in small trusses. They are increased by seeds and by division. Quite apart is the more vigorous growing P. denticulata from the Himalayas. Its flowers, coloured lilac to purple, are produced in round or globular heads. There is a pure white variety which is highly desirable. All may be raised from seeds with the greatest ease, and in flower are most effective. The brilliant orange-scarlet flowered P. Cockburniana, though but little more than a biennial, is too good to be omitted from the most select list. Spare habited, it should be grouped freely and rather closely together. Barely 9 inches in height, it is quite happy in rich vegetable soils, loam, leaf mould, and sand, with good drainage. Then a charming trio of miniatures responding to like conditions are to be found in P. farinosa (Bird's-Eye Primrose), P. frondosa, and P. scotica. All have mealy stems and leaves, the tallest (P. frondosa) rarely reaching 6 inches high, while P. scotica is barely the half of that height. Cool or moist conditions in rich vegetable soils and grit suit them well. They flower in May and June. Easily raised from seeds. Quite charming, too, is the early (April) flowering P. Juliæ from the Caucasus. Very dwarf, mat-forming, and deciduous, it is possessed of a vigour and freedom of blossoming which none excel, and, being amiably

disposed, should be grown by all. Neat and pretty, it bears crowds of reddish-crimson golden-eyed flowers in spring. Beside tiny rivulet or in moist or cool places the white lilac-tinted P. involucrata should be grown. It is both easy and good. Lastly, for the rock garden mention must be made of P. rosea, unique among them all; and that wide and diversified set of varieties known as P. Sieboldi, both of which flourish well in rich moist soils and cool or partially shaded places generally.

Bog-loving Primulas

To cultivators of experience it is well known that not a few of the bolder-growing species of Primula grow most luxuriantly with their feet in water or at least in constant touch with moisture. The best substitute for such conditions is found in cool or moist woodland places, and where these obtain the majority do quite well. Modification of the idea, too, enables the cultivator to grow these plants on a more lavish scale, since the "bog" condition is by no means general in gardens. This notwithstanding, it should be remembered that such as P. pulverulenta, P. Bulleyana, and others, are true bog-loving kinds, the first named only reaching its maximum vigour and flowering in such places, when the 5 to 6 feet high plants with their amazing wealth of blossoms afford a faint idea of their supreme grandeur in Nature's vaster domain. The well-known P. japonica, too, is never so happy as when planted on the sloping sides of brooklet or stream, where its extending roots are ever in touch with water. Here in rich and deep soils and in partial shade the plants attain to giant proportions, widely removed from the wretched caricatures too often seen in herbaceous or shrub borders, where the very essentials of life are denied them. Then it should be noted that the moisture they love so well plays an important part in seedling-raising; fresh seeds falling on

the ever wet soil presently resulting in seedlings by the hundred, at no cost of time or labour to the gardener, and of a vigour greater than those raised by hand. Not only are such object-lessons worth while *per se:* they enable the gardener to grow these plants on a worthier scale and at small cost. And to what better use could the wet or moist places of the garden be put than to adorn them with the best of the Primula life of far-off China and Japan? The more indispensable of them include P. Beesiana, glowing velvety purple; the orange-golden P. Bulleyana, a species of wondrous colour richness and beauty; P. littoniana, strangely orchis-like in flower effect and charm; the unique P. pulverulenta, which at its best towers above them all and imposes its presence on the observer; and the brilliant P. rosea, already noted in the rock-garden set, and which is calculated to be just as happy as the rest in the moist woodland. Where elegant grace is desired, P. sikkimensis (yellow), and P. secundiflora (wine red) should be added to the above; not omitting that wondrous race of hybrids which, having resulted from the crossing of Beesiana and Bulleyana, and providing pictures anew in salmon, apricot, pink, and buff, is already impelling admiration by reason of beauty and charm, ranking high with the best because of a vigour and flower-freedom which none, perhaps, excel.

V.—WOOLLY-LEAVED ALPINES

THERE are among these some of the choicest gems of alpine vegetable life; incidentally, also, not a few that are somewhat fastidious in lowland gardens. Inhabiting high mountain chains, revelling under the most brilliant sunlight, breathing the purest air, and in winter dry, snug, and warm beneath a providential covering of snow, it is little wonder that, suddenly transposed to an altitude a few thousand feet lower down and exposed to alien conditions, damp, cold, fog, or frost, with all the ills that repetitions of such changes bring in their train, some of them, languishing for a time, presently give up so unequal a struggle. Happily, however, these latter are in a minority, and particularly so if considered in relation to that larger assemblage of alpines that appear quite content with the conditions obtaining in British gardens. They are in a minority, too, if considered in company with the large number of woolly-leaved plants that are usually a success. Of those that may be termed consistent failures or at least difficult or miffy under cultivation, such Androsaces as A. imbricata, A. helvetica, A. Wulfeniana, and A. pubescens, may be numbered. These are sun-lovers, and are more likely to become a success if planted (wedged) between sunny fissures of rock where the roots can descend deeply into pulverised limestone, sand, or grit. Overhead dryness in winter, too, means much to these plants. For the first named, finely broken granite should be substituted for limestone. To these four ordinary soil and soil damp are virtually fatal. A. villosa would be happier in a less sunny position, with attention to mulching the tufts

with gritty loam annually, if not more often. A. glacialis is not infrequently found in the soaking wet parts of the Moraine, where with perfect drainage obtaining it is usually a success, a fact which cultivators would do well to keep in mind. Perhaps, however, the most consistently failing and ungrowable of all woolly-leaved alpines is Eritrichium nanum, a cushion plant of the high Alps, of but an inch or so high, whose tiny leaves are thickly beset with silky hairs, and whose tufts in Nature are said to be almost hidden with exquisitely blue flowers. In lowland England this Toy Forget-me-not is but rarely seen, and imported plants, after giving a few scattered flowers, invariably perish. This may be due in part to the condition of the plants received, since it is not only difficult to collect: it suffers much during transit. Partial success has been secured by raising it from seeds in moist, finely chopped sphagnum and grit, and if seeds were available in quantity seedling-raising would be the better way. And the sight of a few of its flowers will reward the cultivator of any pains he may have taken.

Against these there are silky or woolly-leaved alpines which give the cultivator comparatively little trouble: Edelweiss; Origanum Dictamnus, which, being a trifle tender, requires protection; Asperula tuberosa, pinky tubes on hoary tufts; Artemisia glacialis, Senecio incanus, Onosma alba roseum, and O. Bourgæi, all of which are quite content with rather dry sunny spots in deep, gritty loam. Of importance, too, are Androsaces lanuginosa and its variety Leichtlini, A. sarmentosa, and A. Chumbyi, a set difficult to equal for flower beauty and utility combined. Revelling in full sun all, and delighting in a mixture of gritty loam and old mortar rubble, those last named are benefited by an annual mulch of like material finely screened, and, rooting anew into it, take on an increased vigour and development, which in turn are responsible for an enhanced beauty at flowering time another year.

VI.—SAXIFRAGES

The genus Saxifraga is full to overflowing with the choicest gems of the alpine world, and because of its importance to the rock-gardener, its richness and diversity alike as concerns both species and hybrids, it has been decided to devote a brief chapter to it. To further assist, the indispensables in the case—those that merit cultivation on a lavish scale—are dealt with in sectional groups, so that reference to them will be easy.

Cushion Saxifrages

The cushion or crevice-loving Saxifrages—known to botanists and gardeners as the "Kabschia" group—are among the most fascinating of them all, unequalled for sheer beauty or charm. Miniatures, too, in large degree, wondrously prodigal in their flowering, and appearing—the earliest of them—long before many other plants have aroused themselves from their winter's sleep, it is small wonder that they captivate the beholder, and that they gather to themselves an ever-increasing host of admirers and friends. The term "cushion" is suggestive of the miniature mound-like habit of growth of some kinds—aretioides, diapensioides, and Rocheliana, for example—the term "crevice" constituting a finger-post, not to be ignored by the gardener, of the likes or preferences of not a few. That is to say, the rock-inhabiting kinds in nature are happiest and seen to the best advantage in the carefully prepared fissure or crevice in the artificially constructed rock garden where, with an almost illimitable depth of pulverised rock, grit, and loam at

their disposal, they are not only likely to acquit themselves well: they will bejewel the positions for which they are so well suited. Moreover, the measure of protection needed, the uniform conditions of heat or moisture, and not least, the sympathetic association with rock which is so much to these miniatures, are theirs by the same token. In other words, these treasures of the race cannot be seen to a like advantage anywhere else. In the ordinary planting areas they are either lost or do not attract. Soils rich in humus are more or less abhorrent to them, and often fatal to success. Continuous rains, in conjunction with the humid growth-exciting conditions obtaining in lowland gardens, are inimical to their well-being, the absence of the snow-protecting mantle of the homeland but adding to their discomfiture, probably hastening their death. It is in such circumstances that the rock-builder should remember them and cater for their special needs.

All the cushion Saxifrages—species or home-raised—prefer an abundance of grit about their roots; indeed, it is surprising how long they endure and to what perfection they attain in grit alone. It is true that in such material greater attention to watering in summer-time is required. That, however, is a detail now. On the other hand, the richer alien soils in which they grow and flourish for a time but accelerates the end. It is "the pace which kills": a phrase as true of the vegetable as of the animal kingdom.

Most popular among them is S. Burseriana from the Southern and Eastern Alps, with tufts of grey spiny-pointed leaves, above which rise glistening white shilling-large flowers to the accompaniment of reddish stems and calyces. It is 2 inches or 3 inches high, a veritable gem. Notable forms of it are S. b. major and S. b. gloria. These flower in February, and occasionally earlier. S. b. macrantha follows in April. Having a certain affinity with this set are the yellow-flowered hybrids, S. Boydii and S. Faldonside, the last

the queen of yellow-flowered Saxifrages. Ideal for the alpine house, in the rock garden protective fissure or gully in loam and limestone suits them well. The yellow-flowered S. aretioides from the Pyrenees, and one of the presumed parents of S. Boydii, is pretty but difficult. Its variety S. a. primulina is finer and more tractable, a good crevice plant. S. cæsia from the Pyrenees is white, and June-flowering. It forms spreading silvery patches, the creamy white flowers being borne in loose sprays on frail 3-inch high stems. An amiable plant, happy in fissures in loam and limestone with plenty of summer moisture. Quite among the choicest and smallest of true cushion kinds are S. diapensioides and its variety tombeanensis. Rare and beautiful, both are white-flowered. Suited to crevice planting in very gritty loam. March and April. S. lilacina is from the Himalayas. A miniature carpeter of the soil, the reddish-lilac flowers appearing on inch-high stems. Loam and leaf mould with plenty of summer moisture suits it well. Flowers in March, though not freely. S. marginata, S. rocheliana, and S. scardica obtusa, are white-flowered, and grow well in loam, old mortar, and grit. S. sancta from Macedonia separates itself from the "cushion" Saxifrages by its dense mat-forming habit of growth, studded in spring with clusters of deep yellow flowers on sturdy, 2-inch high stems. Vigorous, hardy, free, a lover of moisture, and succeeding in richer soils than the rest, it is admirable for providing broad patches of colour, and effective when not in flower. It is one of the parents of S. Haagei, the most ornamental and profusely flowered of hybrid yellow sorts. In early spring S. Haagei is aglow with golden colour. Treated generously like S. sancta, it responds handsomely. S. bursiculata is a valuable hybrid of Burseriana major and apiculata raised by the author. Amiably disposed and vigorous habited, it is probably the whitest-flowered sort in cultivation. In season in March. A hybrid of great freedom and charm second

to none in popular esteem is S. Irvingi. It originated at Kew, and is named in compliment to Mr. Walter Irving, chief of the hardy plant department there. But an inch or so high, its crowd of pink-tinted flowers, which in March attract everybody, renders it unique. A gem for the alpine house and of the easiest cultivation. Of considerable utility is S. Elizabethæ, of which apparently there are several variations, seedlings, probably, of the same cross. Near akin are Mrs. Leng and L. S. Godseff, and all have pale yellow flowers. None are strictly of the "cushion" type, their free habit and abundant flowering fitting them for greater display in more generous array elsewhere. S. Paulinæ is, however, a gem of the cushion set, whose yellow flowers are but little inferior to Boydii. Albeit they are paler in colour, the hybrid ranks high with the best. Its fine glaucous habit, too, is distinct. Quite an indispensable. The popular and invaluable S. apiculata must also be referred to here, since if a "cushion" Saxifrage at all, it is on a major scale and not of the pigmy tribe that the name is wont to suggest. S. apiculata and its white-flowered varieties are so vigorous habited, too, that they are occasionally grown in the front of the border or as edgings: hence well suited for display purposes in the rock garden. Among the earliest to flower, it is not until March that the heyday of flower beauty is reached, when they vie with any that then obtain.

Encrusted or Silvery Saxifrages

These are distinct from all, bolder generally in habit of growth, while embellishing the summer season with their flower beauty. In winter-time, too, the best of them are of high ornament, silvery or hoary rosettes, freely colonised when flowers are rare, playing an important part amid the vegetable life around. In flower, however, they are of the picture-making order, when gracefully arching plumes,

handsome pyramids, or taller, looser inflorescences, vie with each other, blending at the same time into one great magnificent whole. Some of these attain to 3 feet high or even more, their bountiful sprays of white, crimson-spotted flowers against grey weathered limestone rock attractive indeed. Happily they are not prone to fastidiousness, and for simple cultural needs and early reaching the flowering stage are unequalled. At the same time, rock-loving as they are by nature, position means much to them: hence the bolder fissures or semi-vertical rock gullies in line with the vision and above suits the more imposing of them well. These raised and drier positions, together with a generous fare of loam, old mortar rubble, or lime siftings, with leaf soil and sand, mean much to them, and assist to the fullest development of their characteristic leaf beauty. On level ground—and they are hardy enough for use in such places—because of the prevailing moisture, this winter beauty is not developed; the good effect is lost.

By no means a numerous company, some half dozen or so of species with their varieties will be ample for present purposes. Foremost among them is S. cotyledon, a species abundant on high mountain ranges from the Pyrenees and Alps to Lapland. Variable in character, the largest rosettes may reach to a foot across. S. c. pyramidalis is an instance of this. S. c. icelandica is one of the tallest, though S. montevoniensis, cited by some as a species, runs it close. Offsets are freely produced, and these, detached, are useful for increasing the stock. The S. aizoon forms produce dense masses of rosettes on the soil. They relish moister soil, in which they spread rapidly. Endowed with white or white-pink spotted flowers, none exceed a foot high, some only half this height. S. a. balcana, S. a. Churchilli, S. a. rosularis, and S. a. rosea, are the best. S. cochlearis is one of the most desirable, and for elegant grace or snowy sprays of flowers is unequalled. In its

encrusted character it is more pronounced than any other. The typical kind is 9 inches high, crowded in June with its snow-white sprays of blossoms. S. a. minor is a miniature whose hillocks of silvery white catch the eye at any time. A gem for crevice planting. The frail sprays bear numerous starry flowers of snowy purity. It is both choice and an easy doer.

In a like category for choiceness is S. lingulata, a rather variable species. Long and very narrow leaves and a crowded, horizontally disposed plume of white flowers mark it well. S. l. lantoscana has more arching plumes and broader, shorter leaves. Well suited to rocky ledges where a good depth of gritty loam is at hand for the roots. Here, too, may be mentioned the lovely hybrid Dr. Ramsey, a plant of surpassing beauty and most amiable to boot. Not more than 6 or 8 inches high, its white flowers, copiously spotted red, appear in May and June. Lastly, S. longifolia, the "queen of the long-leaved Saxifrages." It has hoary-grey rosettes that in their fullest development may reach dinner-plate dimensions. In its Pyrenean home it favours the crevices of vertical rocks, and sends out at maturity at a subhorizontal angle spire-fashioned plumes of white 2 feet or so in length. After flowering it dies, and the only way to increase it is by seeds which should be sown almost as soon as gathered. The way to grow it is to colonise the seedlings freely in rock crevices. Nowhere else is it seen to like advantage. Above all, it is Nature's own inimitable way with one of the most precious of her children.

"Mossy" Red-flowered Saxifrages

The term "Mossy" is fairly appropriate here, and in large measure is suggestive of the habit of growth of the plants. It is particularly so as concerns those varieties more directly descended from S. muscoides or its variety Atropurpurea, whose emerald green

carpets covering the earth at all times add a fresh beauty to our gardens in late spring days, when they are shrouded with hundreds of purplish red-petalled flowers. This, indeed, was the earliest of the red "mossy" sorts, and long enjoyed a popularity all its own. Then came the larger, more pinky flowered S. Rhei, from which as a spontaneous seedling the first great break in the red-flowered class "Guildford Seedling" arose. This brilliant pioneer occurred in the collection of the late Mr. Selfe Leonard at Guildford, and though it might be regarded as the first of the improved reds, it still ranks high with the best that have followed, particularly as concerns freedom of flowering and colour richness, not a few others having surpassed it in mere size of flower. Not content to confine his operations to a single species and its one or two forms, the hybridist invoked the aid of some of the bolder-habited growers, which also have much larger flowers. Hence some of the modern red-flowered hybrids are characterised by greater boldness and flowers of increased size. Compared, too, with the pioneers, there is just a suggestion of coarseness, which the big-eyed flowers and habit of growth jointly share. Withal, however, they are wondrously showy; of good effect in the distance, and affording pictures of indescribable beauty unknown in former years, rank with the indispensables of to-day.

Happily, these mossy sorts are of simplest cultural requirements, and may be increased with perfect ease. Culturally they ask for nothing more than a well-cultivated garden soil which is also uniformly cool or even moderately moist. Dry, sun-scorched positions and shallow soils are abhorrent to them. Where a stock obtains they should be divided and transplanted every second or third year. At other times rich, finely-sifted soil as a mulch might be broadcasted on the patches and either worked or watered in. To increase them, all that is necessary

is to pull away the rosettes of leaves and dibble them in moist sand in a cool or shady place or in a frame. Roots, if the cuttings are kept well watered, are formed in a month, and a little later they may be transplanted to permanent places. Of the dwarf-habited red-flowered sorts the following are a selection: Bakeri, Clibrani, Guildford Seedling, Sanguinea superba (the best red), Vivid (scarlet), and Mrs. Lloyd Edwards, rich crimson. Rosea superba and Brilliant Rose are the best of these shades. Of the bolder growing sorts, Bathoniensis and Decipiens grandiflora are the best. There are many others.

VII.—ROCK-MANTLING SUBJECTS

In rock gardens of any pretensions the need for some of these will ever arise; now as a means of effacing more or less obtrusive rock or of supplying garniture of the best; anon of introducing vegetable life in such divers forms that the beauty of the whole is enhanced. In each direction the rock-mantling subject might play a useful part; simple enough when, as a conception of the original rock-builder, rocks are purposely placed to receive such plants, though more difficult when, as a result of after-thought, their introduction becomes somewhat of a necessity in order to screen rock of too aggressive a nature or minimise some of the fundamental errors of construction. Flat and broad slabs upended in meaningless, useless fashion, and rocks of the mile-stone order, are not unknown. To remove them altogether would probably upset much other well-positioned plant life or be impracticable. Hence the only course open is to endeavour to remedy the errors so far as is possible. They occur most frequently as the result of amateurish work, or in that arranged with but little thought. Happily, however, there is ample material and of the right sort suitable alike for large and small erections. How certain plants associate themselves with rock regardless of position is a matter of frequent comment. Cotoneasters microphylla, adpressa, and rupestris will ascend or descend a rock; so, too, the Arenarias among other plants. The prostrate Rosemary, subulata Phloxes, Herniaria, Paronychia, Veronicas like rupestris and prostrata, incline to drape the rocks, while all in turn afford beauty of a rather diverse order. Saponaria ocymoides will readily stream down a rocky way for

a yard or more, and in early summer yield hundreds of its rosy flowers. Some of the Candytufts will do more, and Coronilla cappadocica, golden of flower and glaucous-leaved, will beat them all in this connection: hence in the smaller arrangement they are less desirable. For such as these the medium growers, Phloxes, Campanula muralis, C. garganica, Silene Alpestris, S. Maritima plena, Aubrietias, and Gaultheria nummularioides, will be best. For good flower effect in prominent sunny positions the Cistus should be remembered, while for a great breastwork extending over and beyond cave or the boldest rocks, where Hart's Tongue Fern or Ramondia may have a real good time, I know of nothing to equal the vigorous-growing Cotoneaster horizontalis. It may need the knife occasionally both for limiting its density and extent, and can only be used on the rarest possible occasions. In suitable places, however, it is quite unique for the purpose one has in mind. The following are all serviceable:

Acænas, in variety
Arabis albida, fl.-pl.
Arenaria balearica
Aubrietias (any)
Campanula garganica, in variety
Campanula muralis
Coronilla cappadocica
*Cotoneaster adpressa
* ,, humifusa
* ,, rupestris
Crucianella stylosa
*Cistus salvifolius and others
Dryas octopetala
Dianthus cæsius
Gypsophila prostrata
*Genista saxatilis
Gaultheria nummularioides
*Helianthemums, in variety
Herniaria glabra
Iberis garrexiana
,, sempervirens
*Lithospermum prostratum
Phlox frondosa
,, subulata, of sorts
*Polygonum vaccinifolium
Paronychia serpyllifolia
*Rosmarinus prostrata
Saponaria ocymoides
Saxifraga oppositifolia, vars.
,, "mossy sorts"
Silene maritima, fl.-pl.
,, alpestris
Veronica rupestris

* Indicates "shrubby" kinds; remainder are mostly evergreen and of medium growth.

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